



STUDY AREA 16
(Former Creosote Dip Tank And Fire Fighting Training Area)
Comprehensive Report/Study Area Screening Evaluation Volume
Volume 1: Technical Report And Appendices

Naval Construction Battalion Center
Davisville, Rhode Island

Contract No. N62472-92-D-1296
Contract Task Order No. 60

Prepared for

Department of the Navy
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway
Mail Stop No. 82
Lester, Pennsylvania 19113-2090

Prepared by

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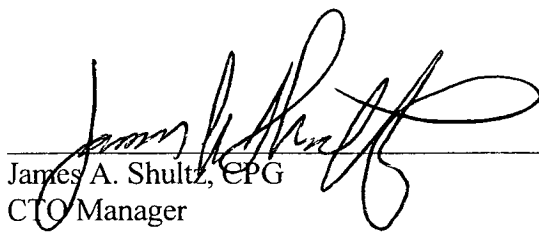
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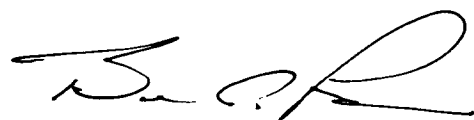
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NAVAL CONSTRUCTION BATTALION CENTER
NORTH KINGSTOWN, RI

CONTRACT NUMBER N62472-92-D-1296
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LIST OF ACRONYMS AND ABBREVIATIONS

AWQC	Ambient Water Quality Criteria
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure Act
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act, 1980
CRDL	Contract Required Detection Limit
DAF	Dilution/Attenuation Factor(s)
DNAPL	Dense, Non-Aqueous Phase Liquid
EA	EA Engineering, Science, and Technology
EBS	Environmental Baseline Survey
EPA	United States Environmental Protection Agency
FFTA	Fire Fighting Training Area
FWENC	Foster Wheeler Environmental Corporation
GPR	Ground-Penetrating Radar
GRO	Gasoline-Range Organics
IDL	Instrument Detection Limit
IDW	Investigative-Derived Waste
IR Program	Installation Restoration Program
MCL	Maximum Contaminant Level(s)
NAS	Naval Air Station
NCBC	Naval Construction Battalion Center
NPL	National Priorities List
PAH	Polycyclic Aromatic Hydrocarbon(s)
PCB	Polychlorinated Biphenyl(s)
PID	Photoionization Detector
ppm	part(s) per million
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAC	Remedial Action Contractor
RBC	Risk-Based Criteria

RCRA	Resource Conservation and Recovery Act
RIDEM	Rhode Island Department of Environmental Management
RIEDC	Rhode Island Economic Development Corporation
RIPA	Rhode Island Port Authority
SASE	Study Area Screening Evaluation
SDWA	Safe Drinking Water Act
SSL	Soil Screening Level(s)
SVOC	Semivolatile Organic Compound(s)
TAG	Technical Advisory Group
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TPH	Total Petroleum Hydrocarbon(s)
USDA	United States Department of Agriculture
USGS	United States Geologic Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound(s)

EXECUTIVE SUMMARY

INTRODUCTION

This Comprehensive Report/Study Area Screening Evaluation (SASE) report has been prepared by EA Engineering, Science, and Technology to address Installation Restoration Program Study Area 16 (Creosote Dip Tank and Fire Fighting Training Area), at the Naval Construction Battalion Center (NCBC) Davisville, Rhode Island. In previous investigations, the site was designated Review Item 28 (Creosote Dip Tank Area) of the Phase II Environmental Baseline Survey (EBS). Based on the results of the most recent investigation, the Base Realignment and Closure (BRAC) Cleanup Team has decided to pursue the investigation of this site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The previous investigations in this area also included suspected former underground storage tanks (USTs), and floor drains and septic tanks associated with Building E-107. This report incorporates the data collected from previous EBS investigations (Phase II EBS and Phase II EBS Follow-On) and recent work performed at the site during October/November 1998, in accordance with the Phase II EBS Follow-On Investigation Work Plan Addendum II.

STUDY AREA 16

Study Area 16 is located in the eastern portion of Zone 3 at NCBC Davisville. The site is generally located within the area surrounded by Davisville Road to the south, Westcott Road to the west, Spink Neck Road to the east, and the Building E-107 area, former pump island area, and Allen Harbor to the north. The actual extent of the Study Area will be determined in a future study. Study Area 16 is primarily wooded with the exception of a paved area in the central portion of the site and a parking area around Building E-107. An unnamed asphalt-paved road circles the outer perimeter of the wooded area of Study Area 16 and was formerly used by the Navy for the purpose of training construction equipment operators. In the past, Study Area 16 was extensively bulldozed and disrupted during training exercises, but now has a vegetative cover of shrubs and grasses. The Navy has conducted investigations in the following areas of concern:

- Creosote Dip Tank Area – Creosote dipping of wood pilings occurred during the late 1960s in the western portion of the site. The wood pilings were dipped into tanks containing creosote and staged in the area to dry before being loaded onto ships. An upended creosote dip tank was located in the western portion of the site adjacent to the paved road. The location where the tank was found is the “original” Creosote Dip Tank Area; however, subsequent work expanded the investigation area, once it was reported that past creosote dipping operations were likely conducted over a larger area than originally noted.
- Former Fire Fighting Training Area (FFTA) – A FFTA was reportedly located in an asphalt-paved area to the east of the former creosote dip tank area. Reportedly, structures were constructed, doused with flammable materials, set on fire, and extinguished as part of fire fighting training exercises during the late 1960s.

- Former Underground Storage Tank Area – UST 68 was removed from the south side of Building E-107 in 1992 (Review Item 85). Subsequently, four USTs were reported to have been located near Building E-107 (Review Item 28). Three of the USTs were reported to have been located to the west of Building E-107 in the vicinity of a pump island. One UST was reported to have been located by the southeast corner of Building E-107.
- Building E-107 Floor Drains – Six floor drains identified in Building 107 (EBS Review Item 86). Two were under floor tile, and four were visible.
- Building E-107 Septic Tanks – An active septic tank and leach field northwest of the building were investigated during the Phase II EBS and Phase II EBS Follow-on Investigations (Review Item 60). A geophysical survey was conducted to locate a second septic tank on the southeast side of the building; however, an extensive program of excavation in the areas of detected magnetic anomalies uncovered no evidence of remaining USTs.

FIELD INVESTIGATIONS

Previous investigations completed at Study Area 16 include: a limited soil removal action in 1992; a 1994 UST Remedial Investigation at UST Location 68, south of Building E-107; a Phase II EBS in 1996 (soil sampling); and a Phase II Follow-On Investigation in 1997 (test pits, magnetometer survey, soil/ground-water sampling, septic tank sludge evaluation). The Remedial Action Contractor (RAC) also conducted test pit excavation and septic tank removals for several Review Items in the Study Area. In October/November 1998, the Navy conducted a Phase II Follow-On Addendum II investigation (soil, ground-water, and seep sampling). The objectives of this most recent investigation were as follows:

- To further evaluate ground water beneath the former Creosote Dip Tank Area, the FFTA, the septic tank formerly located at the southeast corner of Building E-107, and an earth ramp structure southeast of Building E-107;
- To evaluate subsurface soil beneath debris layers observed in test pits during the Phase II EBS Follow-On Investigation; and
- To evaluate the quality of water discharging from a seep near Building E-107 into Allen Harbor.

The objectives of the Phase II Follow-On Workplan Addendum II Investigation were addressed by collecting four subsurface soil samples, one surface soil sample, sixteen ground-water samples from eight locations, and one sample of a seep on the shore of Allen Harbor in the area of Building E-107.

Data from the Phase II EBS, Phase II EBS Follow-On, and Phase II EBS Follow-On Addendum II investigations were compared to Federal and State criteria. The key screening criteria used to

summarize the results were the Rhode Island Department of Environmental Management (RIDEM) Residential Direct Soil Exposure Criteria, the RIDEM Industrial/Commercial Direct Soil Exposure Criteria, the RIDEM Class GB Leachability Criteria, and the Federal Safe Drinking Water Act (SWDA) Maximum Contaminant Levels (MCL) and marine chronic Ambient Water Quality Criteria (AWQC). These criteria were chosen because constituent concentrations above these criteria may drive regulatory actions. The United States Environmental Protection Agency (EPA) Region IX Risk-Based Concentrations (RBC) and Soil Screening Levels (SSL) Dilution Attenuation Factor (DAF) 20 were used if there were no RIDEM criterion for a given analyte.

CONCLUSIONS

The following conclusions are based upon the results of completed and recent investigations at Study Area 16:

Soil

- Semivolatile Organic Compounds [primarily Polycyclic Aromatic Hydrocarbons (PAH)] and several inorganic constituents (arsenic, lead, and beryllium) were detected in soil at concentrations exceeding RIDEM Residential Direct Soil Exposure Criteria or EPA Region IX Residential RBC. The PAH were detected in soil at the original Creosote Dip Tank Area. The inorganics were detected in four samples located throughout Study Area 16.
- Only benzo(a)pyrene was detected in soil exceeding RIDEM's Industrial/Commercial Direct Soil Exposure Criteria or EPA Region IX Industrial RBC. The elevated concentrations of benzo(a)pyrene were detected at two locations within the original Creosote Dip Tank Area.
- Benzo(a)anthracene, acetone, and antimony detected in soil (each in only one sample) exceeded the RIDEM GB Leachability Criteria or SSL DAF-20 criteria.
- Results from soil samples collected at locations where solid waste-type debris had been noted in test pits or soil borings were comparable to other soil results in the study area. Significant impact to soil from this debris was not identified.

Ground Water

- In ground water, only trichloroethene (TCE) detected in one ground-water sample exceeded RIDEM's GB Ground-Water Objective.
- TCE and/or vinyl chloride were detected at concentrations exceeding the Federal MCL in 5 of 8 ground-water sampling locations. Concentrations of both TCE and vinyl chloride were highest within the paved area suspected to be the location of the former FFTA. However, given the variations in the elevations at which ground-water samples were collected, the shape or extent of the area impacted by TCE and vinyl chloride cannot be determined from the available data.

Seep

- Based on the one sample collected from the seep east of Building E-107, lead, dieldrin, endrin, heptachlor epoxide, and phenanthrene were detected at concentrations above marine chronic AWQC. Except for phenanthrene, the concentrations were higher in the seep sample than in a ground-water sample from an upgradient location. Therefore, the constituents detected in the seep sample may be from a source other than Study Area 16 ground water. Potential offsite sources may exist including the two marinas and storm water outfalls from nearby parking lots.

UST Area/Septic Tanks

- In the former UST area west and south of Building E-107, an extensive program of excavation in the areas of detected magnetic anomalies uncovered no evidence of remaining USTs.
- The two steel pontoon tanks southeast of Building E-107 were cleaned and removed. TPH-impacted soil surrounding the pontoon septic tanks was also removed. Final confirmatory samples in this area were below RIDEM Industrial Direct Soil Exposure Criteria and closure reports have been finalized for the UST area and the pontoon tanks.

RECOMMENDATIONS

EA recommends that a Remedial Investigation (RI) focused on ground water be conducted at Study Area 16. The RI should address the following objectives:

- Characterize the hydrogeology (stratigraphy and ground-water flow conditions) at the site;
- Further evaluate the horizontal and vertical extent of Chlorinated Volatile Organic Compounds (CVOC) in ground water;
- Identify the source of CVOC in ground water; and
- Evaluate risk to human health from site constituents.

Additional remedial action is not anticipated for soil, based on the low number and distribution of exceedences of residential or commercial/industrial screening criteria. However, the available soil data should be evaluated using a tiered, streamlined risk assessment approach to ensure protection of human health under the most likely exposure scenarios.

An additional recommendation from EPA and the Technical Advisory Group (TAG) is to include an evaluation of risk to the environment from site constituents. An additional recommendation from the TAG is to include SVOC and metals to the analytical program for soil and ground-water samples. The EPA also recommended that at least the first round of soil and ground-water samples be analyzed for the full TCL/TAL constituents during the RI. An additional recommendation from RIDEM is to include further assessment of the site soils in the RI.

1. INTRODUCTION

This Comprehensive Report/ Study Area Screening Evaluation (SASE) report has been prepared by EA Engineering, Science, and Technology (EA) to address Installation Restoration (IR) Program Study Area 16 (currently designated the "Creosote Dip Tank and Fire Fighting Training Area"), at the Naval Construction Battalion Center (NCBC) Davisville, Rhode Island (Figure 1-1). In previous investigations, the site was called Phase II Environmental Baseline Survey (EBS) Review Item 28 ("Creosote Dip Tank Area").

Study Area 16 includes the former Creosote Dip Tank Area and a suspected former Fire Fighting Training Area (FFTA) in Zone 3 of NCBC Davisville. In this area, the Navy has also completed investigations of suspected former underground storage tanks (UST) and septic tanks and floor drains associated with Building E-107. After the Base Realignment and Closure (BRAC) Cleanup Team (BCT)¹ reviewed preliminary data from the most recent investigation, they decided that Review Item 28 would be renamed Study Area 16, and that further investigation would be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program, rather than the EBS program.

This Study Area 16 Comprehensive Report/SASE incorporates data collected from previous EBS investigations at Review Item 28, as well as the most recent work performed in the Fall of 1998 in accordance with the Phase II EBS Follow-On Investigation Work Plan Addendum II (EA 1998c). This report also summarizes the work completed at UST Location 68 (i.e., Review Item 85), and Review Items 60, 85, and 86, which are located in the Study Area.

1.1 OBJECTIVE AND SCOPE

The objective of this Comprehensive Report/SASE is to present the results of the Phase II EBS Follow-On Addendum II Investigation at Study Area 16 and to compile and include data from the numerous previous investigations. The report presents a comprehensive evaluation of the nature and extent of chemical constituents in environmental media at Study Area 16.

For the Phase II EBS, the Navy investigated 92 locations at NCBC Davisville to evaluate whether or not hazardous substances or petroleum products had been disposed or released to the environment. These locations, designated EBS Review Items, were investigated in accordance with the Phase II EBS Work Plan (EA 1995b). Field work was conducted during Spring/Summer 1996 and the results were reported in the Final Phase II EBS Report (EA 1998a). Three EBS Review Items (28, 60, 85, and 86) were in the Study Area. Review Item 28 comprises the largest area of the site.

Based on the results of the Phase II EBS data, the Navy conducted a Follow-On Investigation at various review items including Review Item 28 during Summer 1997. The results were reported in the Final Phase II EBS Follow-On Investigation Report (EA 1998b). Based on the data from

¹ Consisting of the Navy, the United States Environmental Protection Agency Region I, and the Rhode Island Department of Environmental Management.

the Phase II EBS and the Phase II EBS Follow-On Investigations, the BCT recommended soil and septic tank removal actions as well as further investigation and sampling at the site. This additional field work at Study Area 16 was conducted during October/November 1998 in accordance with the Phase II EBS Follow-On Investigation Work Plan Addendum II (EA 1998c). To date, this is the only report that addresses the results of the Follow-On Addendum II Investigation.

1.2 REPORT ORGANIZATION

This Study Area 16 Comprehensive Report/SASE is organized as follows:

- Chapter 1 presents a brief description of the site and summarizes completed investigations.
- Chapter 2 summarizes the field investigations and sampling programs that were conducted during the Phase II Follow-On Addendum II Investigation.
- Chapter 3 discusses the physical characteristics of the site including the geology and hydrogeology.
- Chapter 4 presents a summary of the site data collected from the previous EBS investigations as well as the recent Phase II EBS Follow-On Addendum II investigation. Chapter 4 also presents an evaluation of the nature and extent of the chemical constituents identified at Study Area 16 as well as a comparison of the data to regulatory criteria.
- Chapter 5 presents the conclusions and recommendations.
- Supporting documentation is presented in the appendices.

1.3 BACKGROUND

1.3.1 NCBC Davisville

NCBC Davisville is located in the Town of North Kingstown, Rhode Island, approximately 18 miles south of the state capital, Providence. NCBC Davisville (Figure 1-1) is composed of three areas: the Main Center (Zones 1 through 4), the West Davisville storage area, and Camp Fogarty – a training facility located approximately 4 miles west of the Main Center. Camp Fogarty was transferred to the U.S. Department of the Army in December 1993 and is assigned to the Rhode Island National Guard. Adjoining the southern boundary of the Main Center is the decommissioned Naval Air Station (NAS) Quonset Point, which was transferred by the Navy to the Rhode Island Port Authority (RIPA) [currently named the Rhode Island Economic Development Corporation (RIEDC)] and others between 1975 and 1980.

NCBC Davisville's mission was to provide mobilization support to the active Naval Construction Force; to act as a mobilization base for the rapid assembly outfitting and readying of Reserve Construction Battalions; to store, preserve, and ship advanced base and mobilization stocks; and to procure, receive, pack, and ship collateral equipment for Atlantic, European, and Caribbean military construction projects. NCBC Davisville is comprised primarily of warehouse space and freight yards, most of which are currently empty.

In 1974, the NAS and a Naval Air Rework Facility at Quonset Point were decommissioned, and operations at the base were greatly reduced pursuant to the Shore Establishment Realignment Act of 1973. In 1989, NCBC Davisville was placed on the United States Environmental Protection Agency's (EPA) National Priorities List (NPL). In 1991, the closure of NCBC Davisville was announced, and operations were phased down to minimum staffing levels for public works, maintenance, security, and personnel. NCBC Davisville was decommissioned on 25 March 1994 and closed on 1 April 1994 under the BRAC. A detailed description of the Base history can be found in the Final Basewide EBS (EA 1995).

NCBC Davisville was transferred to Northern Division, Naval Facilities Engineering Command, which has caretaker status pending disposal. Most of the staff and materials have been moved offsite. Currently, facilities management and security staff engaged with base closure remain on-base. Northern Division is currently working closely with RIEDC towards lease or transfer of suitable parcels.

1.3.2 STUDY AREA 16 (EBS REVIEW ITEM 28)

Study Area 16 is located in the eastern portion of Zone 3 at NCBC Davisville (Figure 1-1). A Site Map is presented in Figure 1-2. The Study Area is generally defined as the area surrounded by Davisville Road to the south, Westcott Road to the west, Spink Neck Road to the east, and the Building E-107 area, former pump island area, and Allen Harbor to the north. The Site boundary shown on Figure 1-2 has been selected for convenience to be related to readily findable roads.

Study Area 16 is primarily wooded with the exception of a paved area in the central portion of the site. The area immediately around Building E-107 is also paved for parking. The area west of Building E-107 (east of Westcott Road) is grass covered. An unnamed asphalt-paved road circles the outer perimeter of the wooded area of Study Area 16 and was formerly used by the Navy for the purpose of training construction equipment operators. In the past, Study Area 16 was extensively bulldozed and disrupted during training exercises, but now has a vegetative cover of shrubs and grasses. The Navy has conducted investigations in the following areas of concern:

- Creosote Dip Tank Area – Creosote dipping of wood pilings occurred during the late 1960's in the western portion of the site. The wood pilings were dipped into tanks containing creosote and staged in the area to dry before being loaded onto ships. In the early 1990's an upended creosote dip tank was identified in the western portion of the site adjacent to the paved road. The location where the tank was found is the "original" Creosote Dip Tank Area that was first addressed by Halliburton NUS in 1992 and was further investigated by EA during the Phase II EBS. However, based on additional information provided by a former Seabee after the Phase II EBS field work was completed, the Navy learned that past creosote dipping operations were likely conducted over a larger area than originally thought. That area comprised the land west of and adjacent to a wooden bermed structure that is still present at the site (Figure 1-2). The Phase II EBS Follow-On and Addendum II work

investigated the “expanded” Creosote Dip Tank Area, based on information provided by the informant.

- Former Fire Fighting Training Area – The Navy informant reported that a FFTA had been located in an asphalt-paved area to the east of the former Creosote Dip Tank Area (Figure 1-2). Reportedly, structures were constructed, doused with flammable materials, set on fire, and extinguished as part of fire fighting training exercises during the late 1960’s.
- Former Underground Storage Tank Area – One UST was removed from the south side of Building E-107 (EBS Review Item 85). Four USTs were subsequently reported to have been located near Building E-107. Three of the USTs were reported to have been located to the west of Building E-107 in the vicinity of a former pump island. One UST was reported to have been located by the southeast corner of Building E-107.
- Building E-107 Floor Drains – Six floor drains identified in Building 107 (EBS Review Item 86). Two were under floor tile, and four were visible.
- Building E-107 Septic Tanks - An active septic tank and leach field northwest of the building were investigated during the Phase II EBS and Phase II EBS Follow-on Investigations (Review Item 60). A geophysical survey was conducted to locate a second septic tank on the southeast side of the building.

1.3.3 Previous Investigations

This section summarizes the field work performed at Study Area 16 and the adjacent UST Area during previous EBS investigations at NCBC Davisville. Sampling results from these investigations are summarized in Chapter 4. Information associated with the Phase II EBS Investigation is presented in Appendix A, information relative to the Phase II EBS Follow-On Investigation is included in Appendix B, and Appendix C includes data gathered during the Phase II EBS Follow-On Addendum II Investigation.

1.3.3.1 Removal Action

In 1992, Halliburton NUS completed a soil removal action in a spill area around the upended creosote dip tank. The removal action included four phases and was intended to remove soil containing elevated concentrations of Polycyclic Aromatic Hydrocarbons (PAH). During the first three phases of the removal action, PAH were detected in soil down to approximately 4 ft below ground surface (bgs). The final phase IV consisted of the excavation of a PAH “hot spot” in soil (not considered to be part of the release) located in the area of the upended tank. At that time, a “hot spot” was defined by Halliburton NUS as soil boring sample concentrations that exceeded job-specific Resource Conservation and Recovery Act (RCRA) Media Cleanup Standards, based on a residential usage scenario. The conclusion of the Halliburton NUS report was that, although some PAH remained, the associated human health risk under a residential usage scenario (1.3×10^5) was within EPA’s acceptable target risk range of 10^{-4} to 10^{-6} .

1.3.3.2 Phase II EBS (EA 1998a)

The Phase II EBS included four studies within the area now designated as Study Area 16: Review Item 28 (Creosote Dip Tank Area), Review Item 60 (Septic Tanks, Building E-107), Review Item 85 (near the former UST south of E-107) and Review Item 86 (Floor Drains, Building E-107).

Review Item 28 during the Phase II field investigation focused on the location of the previous excavation of the original creosote dip tank by Halliburton NUS. Using maps from the previous report and field observations, the former Phase IV excavation was located. On 24 April 1996, soil borings 28-SB-01A through 28-SB-01D² were then installed in the four corners of the former Phase IV excavation (Figure 1-3 – northwest portion of the Study Area). Split-barrel sampling was conducted at each location to a depth of 4 ft bgs. Jar headspace screening of soil samples resulted in a reading of 10.4 parts per million (ppm) from 28-SB-01D. The other jar headspace readings were below 3 ppm. Soil samples were collected from 0 to 2 ft bgs and from 2 to 4 ft bgs at each location. Four of the eight samples collected (28-SB-01A [2-4 ft]; 28-SB-01C [0-2 ft]; and 28-SB-01D [0-2 ft, 2-4 ft]) had to be recollected on 26 April 1996 due to questionable integrity of the sample containers. The samples were recollected and analyzed for PAH.

The locations of two septic tanks were identified by plan review and site inspection during the Review Item 60 investigation. The active tank is located northwest of Building E-107. The tank contains pumps that were formerly used to pump effluent to the leach field. Now it is periodically pumped out. The tank contents were sampled. Because levels of benzene, chlorobenzene, ethylbenzene, xylenes, barium, cadmium, chromium, and mercury were detected in septic sludge at levels that exceeded screening criteria, it was recommended that the tank contents be removed, and the leach field investigated in the Follow-on Investigation. The Remedial Action Contractor (RAC) pumped out and cleaned the tank.

A geophysical survey used Ground-Penetrating Radar (GPR) to locate the second septic tank shown on plans to be in the southern portion of the east side of Building E-107. The GPR signal only penetrated 7 ft bgs because of the high water table and the proximity to Allen Harbor. The GPR survey identified subsurface utility lines and a structure at approximately 6 ft bgs. Excavation was not conducted based on the likelihood that a septic tank would not be buried to 6 ft bgs and because of the proximity of the utility lines. Other septic tanks at NCBC Davisville were flush with the surface. The Phase II EBS recommended no further action for this area; however, two pontoon tanks were subsequently uncovered south of Building E-107 during the Phase II EBS Follow-On Investigation (Section 1.3.3.3).

In 1992, Tank 68 (i.e., a 1,520 gallon UST in Area E) was removed from the south side of Building E-107 by Franklin Environmental Services (Halliburton NUS 1994). This UST was

² In the Phase II EBS report, these locations were designated EBS-28-SB-1 through EBS-28-SB-4. The locations have been renamed to differentiate between soil borings EBS28-SB01 through EBS28-SB04 collected during the subsequent Phase II EBS Follow-On investigation.

reportedly used to store No. 2 fuel oil. In 1994, Halliburton NUS conducted a confirmatory sampling investigation by installing three borings in the vicinity of the former Tank 68. To collect a representative ground-water sample, one of these borings was transformed into a monitoring well. Soil samples from these borings had low TPH (65 ppm) but high jar headspace total volatile organic compounds (VOC) readings (>1000 ppm). Although no further action was recommended under the UST program, the location was designated EBS Review Item 85. The focus of Review Item 85 was to evaluate VOC in soil.

As part of the Phase II EBS, EA installed two soil borings with continuous split-barrels in the approximate location of the former tank, where previously elevated total VOC readings had been obtained by Halliburton NUS. The 0 to 2-ft and 2 to 4-ft intervals from EBS-85-SB-1 and the 2 to 4-ft and 8 to 10-ft intervals from EBS-85-SB-02 were submitted to the laboratory for target compound list (TCL) VOC analyses. Based on the analytical results (Chapter 4) no further action was recommended for EBS Review Item 85.

Six floor drains identified in Building E-107 were examined as a portion of the investigation conducted at Review Item 86. The floor drains were added to the investigation because of the potential threat of eventual discharge to the harbor. Public Works Drawing #594584 depicts three drain lines exiting the building at the southeast corner and into Allen Harbor. The position of the floor drains with respect to these lines shown on the plan suggested they were connected. The RAC excavated test pits between the building and an outfall pipe found at the edge of the harbor. No piping connecting floor drains to the outfall pipe was found. The four visible floor drains were closed by the RAC. The two drains under the floor tile in the sanitary facility were not closed; however, they are inaccessible under the floor tile.

1.3.3.3 Phase II EBS Follow-On Investigation (EA 1998b)

Subsequent to the Phase II EBS investigation, the Navy interviewed a former Seabee who participated in fire fighting training activities in the area in the 1960s. The informant reported that fire fighting training was conducted in the area now paved with asphalt in the center of Study Area 16. The informant also reported that the creosote dipping operations covered a larger area of the property (i.e., not just where the upended dip tank was located). He also reported that he recalled three USTs being associated with a pump island area that is still visible west of Building E-107 as well as one on the south east side of E-107. The Phase II EBS Follow-On Investigation evaluated the expanded Creosote Dip Tank Area, the reported FFTA, and the reported UST area.

The Phase II EBS Follow-On Investigation included a review of low altitude oblique angle aerial photographs, installation of soil borings and test pits in the expanded Creosote Dip Tank Area and the alleged FFTA, a magnetometer survey to assess whether USTs were still present in the ground west of and adjacent to Building E-107, test pit excavations to investigate the magnetic anomalies, and ground-water sampling from the former FFTA.

Creosote Dip Tank Area

Between 17 and 24 June 1997, eleven soil borings (28-SB-01, -02, -03, -04, -05, -06, -11, -12, -13, -15, and -16) were installed using hollow-stem augers in the area identified as the location of the former creosote dip tanks (Figure 1-3). Continuous split-barrel samples were collected from the ground surface to approximately 2 ft into the water table. One soil boring (28-SB-15) was advanced to auger refusal at 34 ft bgs. Two samples were collected from each boring location for laboratory analysis: one from the 0 to 2 ft interval and one from the sample with the highest headspace photoionization detector (PID) reading. Headspace readings are presented in Appendix D. Soil samples were analyzed for TCL-Semivolatile Organic Compounds (SVOC), TCL-VOC, and Total Petroleum Hydrocarbons (TPH) (Method 418.1). Approximately 20% of the samples were also analyzed for purgeable [gasoline-range organics (GRO)] TPH by modified Method 8015. One surface soil sample (28-SS-01) was collected from a gray soil horizon encountered in the wooden cribbing of the bermed structure and was analyzed for TCL-SVOC, TCL-VOC, and TPH (Method 418.1).

During soil boring installations, refusal was encountered at approximately 4 ft bgs in a non-vegetated, cobbled area east of the location of the upended dip tank. The boring was offset several times in an attempt to bypass the obstruction. On 14 July 1997, three test pits (TP-1, TP-2, and TP-3 as shown on Figure 1-3) were excavated in the area where refusal was encountered during drilling. Large cobblestones were encountered during the excavation, which accounted for the shallow auger refusal during drilling activities. Metal, wood, and glass debris were uncovered at 2 to 5 ft bgs in the three test excavations. No samples were collected for laboratory analysis from the test pits. In addition, wood and other debris were found in split-barrel soil samples from 28-SB-11 and 28-SB-12.

Based on the sampling results (Chapter 4), the Phase II EBS Follow-On Investigation recommended no further action for the original Creosote Dip Tank Area. However, the Navy planned to collect additional soil samples from the test pit locations where debris, porcelain shards, and glass were encountered as well as collecting shallow and deep ground-water samples. The additional sampling was planned and conducted as the Phase II EBS Follow-On Addendum II investigation (Section 1.4).

Fire Fighting Training Area

Between 17 and 24 June 1997, five soil borings (28-SB-07, -08, -09, -10, and -14) were installed in the reported former FFTA (Figure 1-3). Split-barrel samples of the soil were collected continuously from the ground surface to 2 ft into the water table. One boring (28-SB-14) was advanced to auger refusal at 42 ft bgs. Two samples were collected from each boring location for laboratory analysis: one from the 0 to 2 ft interval and one from the sample with the highest headspace PID reading. Soil samples were analyzed for TCL-SVOC, TCL-VOC, and TPH (Method 418.1). Approximately 20% of the samples were also analyzed for purgeable (GRO) TPH by modified Method 8015. Wood, porcelain, and glass debris were observed in soil samples collected from 28-SB-07, 28-SB-08, and 28-SB-14. One shallow ground-water sample

(28-GW-01A) was collected adjacent to 28-SB-14 using hydraulically-driven, direct-push sampling equipment. The sample was analyzed for TCL-VOC and TCL-SVOC.

Based on the sampling results (Chapter 4), the Phase II EBS Follow-On Investigation recommended no further action for soil at the former FFTA. However, the Navy planned to collect additional ground-water samples during the Phase II EBS Follow-On Addendum II investigation (Section 1.4) to further investigate the ground-water quality at Study Area 16. These data were also to be used to confirm the ground-water sampling data from the FFTA.

UST Investigation

A magnetometer survey was conducted in two areas where the Navy informant recalled that USTs were located. This area was to the west of, and at the southeast corner of, Building E-107 (Figure 1-2). Locations for the magnetometer readings were established in a grid pattern. One 30 ft × 90 ft grid was established to the south of Building E-107 and a second 100 ft × 120 ft grid was established around the area of the pump island west of Building E-107 (Figure 1-2). The magnetometer survey results are presented in Appendix B-2.

Areas where magnetic anomalies were detected within the grids were subsequently investigated by Foster Wheeler Environmental Corporation (FWENC) with nine test pits in an attempt to identify the source of the anomalies. No tanks were discovered. Although some metal debris was encountered in the test pits, the volume of debris was not sufficient to account for the detected magnetic anomalies. FWENC excavated the nine test pits in July 1997. Three soil samples (EBS28-P03, -P45, and -P40-2) were collected and analyzed for TPH (Methods 418.1 and 8015M), TCL-VOC, TCL-SVOC, pesticides, polychlorinated biphenyls (PCB), and RCRA 8 metals. A copy of FWENC's test pit logs and analytical findings are presented in Appendix B-3.

In August 1997, EA, in collaboration with FWENC, expanded the test pits in the two grid areas in an attempt to more adequately account for the reported magnetic anomalies. A copy of the EA/FWENC test pit logs and a site map showing the locations of these test pits are included in Appendix B-4.

In addition, a small test pit was also excavated across the asphalt-paved road in the area of the pipe from the pontoon septic tank. The pipe was found to continue under the road and approximately 50 ft into the wooded area south of Building E-107, where it ended.

Overall, the extensive program of excavation in the areas of detected anomalies uncovered no evidence of remaining USTs. The Phase II EBS Follow-On Investigation recommended no further action for the UST area.

Septic Tanks Associated with Building E-107

As described in the table for Test Pit 8 (Appendix B-3), an inactive septic tank and a quantity of petroleum-impacted soil were found on the south side of the southeast corner of Building E-107. A search for this septic tank was conducted as part of the investigation for Review Item 60. During the soil excavation two tanks were encountered. Based on the analytical data from the three soil samples (below the RIDEM Industrial/Commercial Direct Soil Exposure and DAF-20 criteria except for the sample EBS28-P-45), it was recommended that additional soil be removed from one of these sample locations and that additional post-removal confirmatory samples be collected and analyzed for TPH (Method 418.1), SVOC, and pesticides. The Navy directed FWENC to remove the septic tank and the associated petroleum impacted soil in that area.

On 9 December 1997, FWENC cleaned and removed the two steel pontoon tanks (approximately 7 ft x 5 ft x 5 ft each) (FWENC 1998a). The first tank served as a sludge settling tank and the second tank served as a liquid overflow tank. The tanks, which were situated in a 1 ft minus gravel pack, had circular holes randomly cut out of the bottom and lower edge of all four walls (designed to act as cesspools, collecting solids and discharging liquids to the surrounding soil).

FWENC removed the liquids and flowable solids from the septic tanks located to the southeast of Building E-107 (FWENC 1998b). The tanks, the gravel packing, and 1 ft of soil beyond the gravel packing were removed. The inlet line to the septic tanks from Building E-107 was severed near the tank and sealed with grout. The excavation was extended to the south to remove TPH impacted soil that was encountered during test pit operations. Once excavations were complete, confirmatory samples were collected. The excavated was lined with polyethylene sheeting and then backfilled. The confirmatory samples contained chemical constituents above RIDEM Industrial Direct Soil Exposure Criteria; therefore, the excavation was re-opened and the east and west side-walls were extended an additional 2 ft. A pipe leading toward the septic tanks from the south was uncovered and sampled at every 15 linear ft of piping for TPH, VOC, and SVOC analyses. A total of 274 tons of TPH-impacted soil was removed during excavation activities and the two pontoon tanks were sent offsite for metal recycling. Final confirmatory samples were below RIDEM Industrial Direct Soil Exposure Criteria.

1.4 Phase II EBS Follow-On Addendum II Investigations

Based on the data from the Phase II EBS (EA 1998a) and the Phase II EBS Follow-On Investigation (EA 1998b), the BCT recommended further investigation and sampling at Study Area 16. This additional field work at Study Area 16 was conducted during Fall/Winter 1998 in accordance with the Phase II Follow-On Investigation Work Plan Addendum II (EA 1998c). The objectives of the Study Area 16 investigation were:

- To further evaluate ground water beneath the former Creosote Dip Tank Area, the former FFTA, the septic tank formerly located at the southeast corner of Building E-107, and the earth ramp structure southeast of Building E-107;

- To evaluate subsurface soil beneath debris layers observed in test pits in the Creosote Dip Tank Area during the Phase II EBS Follow-On Investigation; and
- To evaluate the quality of water discharging from a seep near Building E-107 into Allen Harbor.

The objectives of the Phase II EBS Follow-On Addendum II investigation were addressed by collecting four subsurface soil samples, one surface soil sample, sixteen ground-water samples from eight locations, and one sample of a seep on the shore of Allen Harbor in the area of Building E-107.

1.4.1 Soil Sampling

In October/November 1998, during the Phase II EBS Follow-On Addendum II Investigation, EA collected four subsurface soil samples (28-SB-17, -18, -19, and -20) from the 2 ft interval beneath the observed or reported layer of debris (Figure 1-3). The sampling interval ranging from 8 ft to 12 ft bgs was selected based upon a review of the boring and test pit logs completed in this vicinity during previous investigations as well as visual observations (e.g., pulverized rock, wood chips, geotechnical results, etc.) recorded in the logs of the newly advanced soil borings. Subsurface soil samples were analyzed for TPH (Method 418.1), TPH-GRO (Method 8015M), TCL-VOC, TCL-SVOC, pesticides, PCB (Method OLM03.2), and Target Analyte List (TAL)-Metals (ILM04.0). One subsurface soil sample was collected from each of the following locations:

- In 28-SB-17, a sample was collected from the 2 ft interval below the debris layer observed in Test Pit 1 during the Phase II EBS Follow-On Investigation.
- In 28-SB-18, a sample was collected from the 2 ft interval below the debris layer observed in Test Pit 2 during the Phase II EBS Follow-On Investigation.
- In 28-SB-19, a sample was collected from the 2 ft interval below the debris layer observed in Test Pit 3 during the Phase II EBS Follow-On Investigation.
- In 28-SB-20, a sample was collected in the vicinity of previous soil borings 28-SB-07 and 28-SB-11 due to the subsurface debris that was observed at those locations. The sample was collected from the 2 ft interval below the observed debris layer (observed to be at depths ranging from 2 to 6 ft bgs at these locations during the Phase II EBS Follow-On Investigation).

In addition to the four subsurface soil samples, one surface soil sample (28-SS-21) was collected at the northern end of a drain pipe near a swale located southeast of the concrete ramp and bermed structure. The sample location was selected by EPA.

1.4.2 Ground-Water Sampling

In October/November 1998, sixteen ground-water samples were collected at the following eight locations using hydraulically driven sampling equipment (Figure 1-3):

- Original Creosote Dip Tank Area – Three sample locations (28-GW-01, -02, and -03) were selected on a line perpendicular to the inferred ground-water flow direction and downgradient of the former creosote dip tank operations area and the location of the test pits excavated during the Phase II EBS Follow-On Investigation conducted in June 1997 (TP-1, TP-2, and TP-3 as shown in Figure 1-3). The ground-water flow direction was based upon the Basewide Ground-Water Study results (Stone & Webster 1997). The location 28-GW-03 was placed on the downgradient side of the wooden bermed structure. At each sampling location, one ground-water sample was collected from the shallow interval and one sample was collected at the 2 ft interval above refusal.
- Former FFTA – Two ground-water sample locations (28-GW-04 and -05) were selected to further evaluate the former FFTA. At each sampling location, one ground-water sample was collected from the shallow interval and one sample was collected at the 2 ft interval above refusal. Location 28-GW-05 was also used to confirm the previous shallow ground-water data from nearby 28-GW-01A.
- South of Building E-107 – One ground-water sample location (28-GW-06) was selected on the downgradient side of the trench that was excavated during the removal of the pipe that discharged from the septic tank at the southeast corner of Building E-107. At this location, one ground-water sample was collected from the shallow interval and one ground-water sample was collected at the 2 ft interval above refusal.
- Allen Harbor Shoreline – One ground-water sample location (28-GW-07) was selected between the seep observed at the shore of Allen Harbor and the septic tank found at the southeast corner of Building E-107. At this location, one ground-water sample was collected from the shallow interval and one ground-water sample was collected at the 2 ft interval above refusal.
- Earth Ramp Structure – One ground-water sample location (28-GW-08) was selected on the downgradient side of the earthen ramp (Figure 1-2) structure southeast of Building E-107. At this location, one ground-water sample was collected from the shallow interval and one ground-water sample was collected at the 2 ft interval above refusal.

According to the Phase II EBS Follow-On Investigation Work Plan Addendum II, if during the subsurface exploration a silt layer greater than 4 ft thick was encountered, a ground-water sample was to be collected directly above this unit. While attempting to collect a shallow and deep ground-water grab sample from each of borings 28-GW-03, -04, -05, -06, 07, -08, EA encountered running sands (i.e., saturated sands which flowed into the sampling rods) at a depth ranging between 15 ft and 20 ft bgs. The running sands prevented the collection of soil samples (thus no

soil logging) below this depth when the hole would no longer remain open. It was not possible to observe a silt layer greater than 4 ft thick; therefore, no ground-water sample could be collected above this unit.

The shallow ground-water sample was collected from a depth ranging from 6 ft to 12 ft bgs and the deep ground-water sample was collected from the 2-ft interval above equipment refusal. During the advancement of the direct-push explorations, the subcontractor determined refusal when the probe could no longer be advanced. The casing was then retracted 2 ft and a ground-water sample was collected.

The ground-water samples were analyzed for TCL-VOC, TCL-SVOC, pesticides (Method - OLM03.2), and dissolved (filtered) TAL-metals (Method ILM04).

1.4.3 Seep Sampling

On 15 October 1998, a sample was collected from the ground-water seep identified at the shore of Allen Harbor adjacent to the east side of Building E-107 (Figure 1-3). The grab sample was collected at the time of the lowest tide. The seep sample was analyzed for TCL-VOC, TCL-SVOC, pesticides (Method -OLM03.2) and dissolved (field-filtered) TAL-metals (Method ILM04.0).

2. FIELD INVESTIGATIONS AND PROCEDURES

This chapter outlines the procedures used at Study Area 16 for sampling subsurface soil, ground water, and the surface water seep during the Phase II EBS Follow-On Addendum II Investigation. Work was conducted in accordance with the Phase II EBS Follow-on Investigation Work Plan Addendum II (EA 1998c). Table 2-1 presents a summary of the sample locations, the number of samples collected, the analytical parameters, the analytical methods, and the Quality Assurance/Quality Control (QA/QC) samples collected.

The field procedures for previous phases were presented in the Phase II EBS Work Plan (EA 1995b) and the Phase II EBS Follow-On Investigation Work Plan (EA 1997).

2.1 GROUND-WATER SAMPLE COLLECTION

Ground-water samples were collected using hydraulically-driven sampling equipment (geoprobe) in accordance with the procedures outlined in the Phase II EBS Follow-On Investigation Work Plan Addendum II (EA 1998c).

2.2 SUBSURFACE SOIL SAMPLE COLLECTION

Subsurface soil samples were collected using a hydraulically-driven, soil sampling apparatus in accordance with the procedures outlined in the Phase II EBS Follow-On Investigation Work Plan Addendum II (EA 1998c).

2.3 SEEP SAMPLE COLLECTION

A sample from the seep at the edge of Allen Harbor was collected in accordance with the procedures outlined in the Phase II EBS Follow-On Investigation Work Plan Addendum II (EA 1998c).

2.4 SAMPLE PACKAGING AND SHIPPING, DESIGNATION AND LABELING

Sample packaging, handling, custody, and shipping procedures were conducted in accordance with the procedures outlined in the Phase II EBS Work Plan (EA 1995b).

2.5 SAMPLE DOCUMENTATION

Sample documentation procedures were conducted in accordance with the procedures outlined in the Phase II EBS Work Plan (EA 1995b).

2.6 QUALITY ASSURANCE/QUALITY CONTROL

Laboratory and field QA/QC procedures were conducted in accordance with the Phase II EBS Work Plan Addendum II Quality Assurance Project Plan (QAPP) (EA 1998c).

2.7 CHAIN-OF-CUSTODY FORMS

Chain-of-custody forms were completed in accordance with the procedures outlined in the Phase II EBS Work Plan (EA 1995b).

2.8 DECONTAMINATION PROCEDURES

Decontamination cleaning of the sampling equipment was conducted in accordance with the procedures outlined in the Phase II EBS Work Plan (EA 1995b), except that isopropyl alcohol was used in place of methanol.

2.9 WASTE HANDLING PROCEDURES

Waste handling was conducted in accordance with the procedures outlined in the Phase II EBS Work Plan (EA 1995b).

2.10 WASTE TESTING AND DISPOSAL

Investigative-Derived Waste (IDW) testing and disposal was conducted in accordance with RIDEM, Division of Site Remediation Policy Memo 95-01. IDW was characterized for final disposal using the sampling results from this investigation. IDW disposal was coordinated with that from the Phase II EBS Review Item 21 Site Investigation. IDW was removed by General Chemical Corporation in March 1999.

2.11 SURVEYING

The sampling locations within Study Area 16 were surveyed by a State of Rhode Island registered surveyor. The locations and elevations of the sampling points established during the Phase II EBS and Phase II EBS Follow-On Investigations (including soil borings, geoprobe soil and ground-water locations, and surface soil locations) were surveyed with respect to NAVD 29 and NAVD 27 datum locations in conjunction with the Rhode Island Plane Coordinate System (Appendix C-2)¹.

2.12 DATA INTERPRETATION

This section presents the type of field and laboratory analytical data collected, the screening criteria used to evaluate these data, and the data validation procedures that were employed.

¹ The correct survey data are presented in Appendix C-2. However, the aerial photos presented in this report are not available with an accurate match to the coordinate system used by the surveyors. Therefore, sample locations depicted in those figures were plotted based on the best available knowledge of the field work performed.

2.12.1 Field Screening Data

Field screening conducted during the Phase II EBS Follow-On Addendum II Investigation included HNu/PID monitoring, in accordance with the Health and Safety Plan, and jar headspace screening of soil.

2.12.2 Laboratory Analyses

Table 2-1 presents a summary of the number of samples collected, the analytical parameters, and the analytical methods used at Study Area 16. The number of field samples and required laboratory analyses were selected with the concurrence of the BCT, as presented in the Final Phase II EBS Follow-On Investigation Addendum II Work Plan (EA 1998c).

Surface and subsurface soil samples were collected and analyzed for TPH (Method 418.1), TPH-GRO (Method 8015M), TCL-VOC, TCL-SVOC, pesticides/PCB (Method OLM03.2), and TAL-metals (Method ILM04.0). Approximately 20% of the samples were also analyzed for TPH-GRO by modified Method 8015. Ground-water samples were analyzed for TCL-VOC, TCL-SVOC, pesticides (Method OLM03.2), and dissolved (filtered) TAL-metals (Method ILM04.0).

2.12.3 Screening Criteria for Data Analysis

The data collected at Study Area 16 from the previous investigations (Phase II EBS and Phase II EBS Follow-On investigation) and the recent Phase II EBS Follow-On Addendum II Investigation were evaluated with respect to selected regulatory guidance criteria and state cleanup criteria. The purpose of the screening was to qualitatively assess potential risks to human health and to evaluate the need for further response action (or no further action) at the EBS Review Item areas. The review items were being assessed for suitability for lease or transfer.

One challenge in summarizing the data sets from the various investigations is that screening criteria changed over the period during which evaluations were performed. In 1995, when the Phase II EBS work plan was approved by EPA/RIDEM, a set of screening criteria were selected that included RIDEM Remediation Regulation criteria and objectives, EPA Region III Risk Based Criteria (RBC) and EPA Generic Soil Screening Levels (SSL) for Transfer to Ground Water. Also, at the request of RIDEM, values for TPH quantified in different ways (as gasoline, as diesel, and as hydraulic fluid) were summed to present a total TPH value. This sum, which was not quantitatively accurate because the diesel and hydraulic ranges overlap significantly on the analytical chromatogram, presented a conservative, qualitative value that was compared to RIDEM cleanup criteria for TPH.

In 1996, the RIDEM Remediation Regulations changed. Direct Soil Exposure Criteria, Leachability criteria, and Ground-Water Objectives changed for some analytes, including TPH. Therefore, in subsequent EBS reports, the BCT requested that the new RIDEM criteria be applied, and that EPA Region IX RBC be used for screening criteria. Also during subsequent

investigations, the Navy did not quantify TPH in both the overlapping diesel and hydraulic ranges and, therefore, did not present the qualitative “total TPH” value.

The screening criteria used to evaluate the data in this report are presented in Tables 2-2 through 2-6. The criteria used are summarized in the following table:

TYPE	SCREENING CRITERIA USED
Federal	<ul style="list-style-type: none"> EPA Region IX Preliminary Remediation Goals for residential and industrial soil [Risk-Based Criteria (RBC)] EPA Generic Soil Screening Levels (SSL) for migration to ground water based on Dilution/Attenuation Factors (DAF) of 1 and 20 from the <i>EPA Soil Screening Guidance, Technical Background Document</i> dated May 1996. Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCL). Ambient Water Quality Criteria (AWQC).
State	<ul style="list-style-type: none"> RIDEM Division of Site Remediation Residential and Industrial/Commercial Direct Soil Exposure Criteria from the Final Remediation Regulations (DEM-DSR-01-93) as amended August 1996 (effective 4 September 1996). RIDEM Division of Site Remediation Class GB Leachability Criteria (RIDEM 1996) from the Final Remediation Regulations (DEM-DRS-01-93) as amended August 1996 (effective 4 September 1996). RIDEM Division of Site Remediation Class GB Ground-Water Objectives (RIDEM 1996) from the Final Remediation Regulations (DEM-DSR-01-93) as amended August 1996 (effective 4 September 1996).
Site-Specific	<ul style="list-style-type: none"> NCBC Davisville background data for metals in surface soil (TRC 1994).

Study Area 16 is located in a “GB” ground-water area. RIDEM has classified ground water at NCBC Davisville as “GA”, “GAA”, “GAA-NA”, or “GB.” Ground-water resources classified as “GA” or “GAA” are those which are assumed by RIDEM to not require treatment prior to drinking. Non-attainment (e.g., “GAA-NA”) areas are those areas that have known or presumed pollutant concentrations greater than the ground-water quality standards for the applicable classification. Ground-water resources classified as “GB” are those which are assumed by RIDEM to require treatment prior to drinking.

The Study Area 16 data were evaluated with respect to the screening criteria as follows:

- Ground Water – Analytical data from ground-water samples were compared with the RIDEM GB Ground-Water Objectives. Although ground water beneath Study Area 16 is unlikely to be used as a drinking water supply, the ground-water sample data were also compared to Federal drinking water MCL.
- Seep Water – Analytical data from the seep sample collected at the Allen Harbor shoreline were compared to the chronic/marine AWQC.
- Soil for Direct Exposure – Analytical data from soil samples were compared to RIDEM Residential and Industrial/Commercial Direct Soil Exposure Criteria, or the EPA Residential

and Industrial RBC if a RIDEM Direct Soil Exposure Criterion was not available for a specific analyte.

- Soil for Leachability to Ground Water– The soil data were also compared to the RIDEM Class GB Leachability criteria, or the EPA Generic SSL for Transfer to Ground Water if RIDEM criteria were not available for a given analyte (e.g., SVOC, inorganics). For the SSL evaluations, both the DAF-1 and the DAF-20 criteria were considered; however, the DAF-20 criteria are considered to be more appropriate for the conditions at Study Area 16. EPA's Generic SSL were derived using default values in standardized equations. DAF-20 criteria account for the natural processes that reduce chemical constituent concentrations in the subsurface. DAF-1 criteria assume no dilution or attenuation between the source and a receptor well. DAF-1 values can be appropriate for sites where little or no dilution or attenuation of soil leachate concentrations is expected (e.g., sites with shallow water tables, fractured media, karst topography, or source size greater than 30 acres). Therefore, the DAF-20 values are more appropriate for Study Area 16 given the GB ground-water classification, the silty soils, and the lack of ground-water receptors. Although DAF-1 criteria were considered in the text for completeness, recommendations for further action were not based on these criteria. Finally, if the concentration of an inorganic constituent exceeded any of these criteria, then the concentration was also compared to NCBC Davisville background values for surface soil (subsurface soil background data are not available).

2.12.4 Data Validation

Third-party validation of the EA Laboratory ground-water and soil sample results for the Phase II EBS Follow-on Investigation Addendum II samples (Fall 1998) was performed by a qualified subcontractor to EA. Data validation summaries are presented in Appendix H of the EBS Report. Data validation was performed in accordance with EPA Region I guidance (EPA 1988, 1989). The data was validated using the older EPA guidelines to maintain consistency with previous investigative data at the site. Validation of soil and ground-water data collected during Summer 1997 is presented in the Phase II EBS Follow-On Investigation Report (EA 1998b).

3. PHYSICAL CHARACTERISTICS

This chapter describes the local and regional physical characteristics of Study Area 16. Descriptions of subsurface physical features at Study Area 16 are based upon the field investigations, including soil borings and geoprobe installations. A description of the regional geologic and hydrogeologic setting is provided, along with specific characteristics pertaining to Study Area 16.

3.1 PHYSIOGRAPHY

NCBC Davisville is located on the Seaboard Lowland coastal belt of the New England physiographic province (Fenneman 1938), and within the Narragansett Basin of metamorphosed sedimentary rocks of Pennsylvanian age. The surface topography near NCBC Davisville (from Quonset Point to a point approximately five miles west of Quonset Point) exhibits over 150 ft of relief in a series of north-south trending valleys and ridges (Williams 1964). These valleys were developed by river and stream erosion and deepened by glacial activity. Surface drainage is not well developed, and swamps and marshes are extensive. Streams are small and, in most places, bordered by swamps.

Nearly all the surficial deposits are of glacial origin deposited during the Wisconsin Glacial Stage. The glacial deposits record a single invasion of the ice sheet and are only slightly modified by post-glacial weathering and erosion (Schafer 1961). Portions of the land surface at NCBC Davisville have undergone significant modification, e.g., hills were leveled and depressions filled in, as part of the original construction of the base as well as during military training operations

The topography at Study Area 16 has a gradual slope from the south down to sea level at the Allen Harbor shoreline. In the past, the site was extensively bulldozed, but now has a thick vegetative cover of shrubs and grasses. No freshwater wetlands are located in Study Area 16. A partially paved access road encircles the immediate area. A small paved area is located within the site as well as a wooden bermed structure and an earth ramp structure (Figure 1-2).

3.2 CLIMATE CHARACTERIZATION

Given the coastal proximity of NCBC Davisville, weather patterns are continuously modified by the dynamic effects of the Narragansett Bay and the Atlantic Ocean. The average annual wind speed over the area is 10.6 miles per hour (mph) with a prevailing southwesterly direction. In the winter, the average temperature is 30°F and average daily minimum temperature is 20°F. In the summer, the average temperature is 70°F and average daily maximum is 80°F.

The average annual precipitation for the area is 45.32 in., as measured for the period of 1951 through 1980. Historically, June has been the driest month with an average of 2.79 in. of precipitation, whereas December, averaging 4.47 in., has been the wettest.

3.3 SURFACE WATER HYDROLOGY

3.3.1 Regional Surface Water

The State of Rhode Island is divided into five drainage basins: the Narragansett Bay Basin, the Pawtucket River Basin, the Rhode Island Coastal Basin, the Thames River Basin, and the Massachusetts Coastal Basin. NCBC Davisville lies within the Narragansett Bay Basin, the largest and most hydrogeologically significant basin in the state. The Narragansett Bay Basin covers approximately two-thirds of the state and includes a system of waterways that discharge into the Atlantic Ocean between Point Judith and Sakonnet Point. The Narragansett Bay Basin includes Narragansett Bay and its entire shoreline, the drainage system of three major rivers (Taunton, Blackstone, and Pawtuxet), and a number of small rivers and streams that drain into Narragansett Bay (USDA 1981). Within each drainage basin, smaller sub-basins may be defined based on significant streams, tributaries, and reservoirs.

Rhode Island's abundant precipitation, numerous perennial streams, lakes, and reservoirs provide a significant surface supply of fresh water for the states' industry and domestic consumption. Additionally, three primary aquifers provide fresh ground water for the state. In 1985, the total freshwater withdrawals in Rhode Island were 147 million gallons per day. Of this, approximately 69% was for domestic and commercial use, 27% was for industrial and mining use, and 4% was for agricultural use. 81.5% of the fresh water was obtained from surface water sources and the remaining 18.5% was from ground water. The Scituate Reservoir in Providence County accounts for more than 80% of the reservoir storage capacity in Rhode Island. Approximately 76% of the State's population receives its drinking water from the Rhode Island reservoir system. Approximately 24% obtain potable water from public supply wells (USGS 1989). There are also an unknown number of private residential water supply wells.

The quality of Rhode Island's surface water is affected primarily by land use and commercial factors such as urban runoff, point-source discharge, and municipal/industrial wastewater discharge (USGS 1993). In sparsely populated areas, stream water quality is affected mainly by impurities in precipitation and by constituents released from the soil and rock. Because the bedrock, glacial deposits, and soil in Rhode Island are composed largely of insoluble silica minerals, concentrations of dissolved inorganic constituents are low. Surface water in Rhode Island is soft [hardness less than 60 milligrams per liter (mg/L) of calcium carbonate] and slightly acidic (pH values less than 7).

3.3.2 Local Surface Water

No surface water bodies or wetlands are present at Study Area 16. Allen Harbor is located adjacent to Study Area 16 to the north/northeast. Overland runoff at Study Area 16 drains to Allen Harbor, which has tidal exchanges along with Narragansett Bay.

3.4 GEOLOGY

3.4.1 Regional Geology

NCBC Davisville is located within the Narragansett Basin, a complex structural syncline approximately 12 miles wide and with up to 12,000 ft of accumulated sediment deposited within this feature. The Narragansett Basin's western limit is approximately three miles west of NCBC Davisville, and its eastern edge is close to Fall River, Massachusetts. Each of the NCBC Davisville sites, with the exception of Camp Fogarty, overlie a portion of the Narragansett Basin. The bedrock is overlain by various glacial deposits up to 200 ft thick that have left the basin relatively flat compared to the surrounding areas (Schafer 1961). According to Williams (1964) and USDA (1981), the principal bedrock unit in the vicinity of NCBC Davisville is the Pennsylvanian age undifferentiated Rhode Island Formation. The original sedimentary rocks were fine- to coarse-grained sandstone and shale. Throughout the Rhode Island Formation, these sedimentary rocks have been metamorphosed into various types of meta-sandstone (quartzite), phyllite, gneiss, and schist. The amount of metamorphism increases from north to south across the formation. The color of the rock varies from light to dark gray, and greenish. The Rhode Island Formation is further characterized by cross-bedding and irregular, discontinuous beds. In the vicinity of NCBC Davisville, the depth to bedrock ranges from approximately 30 ft above ground surface to nearly 100 ft bgs.

The unconsolidated Quaternary sediments overlying bedrock were deposited by glacial activity during the Pleistocene epoch. The final deposition of glacial material occurred during the Wisconsin glacial stage 10,000 to 12,000 years ago. As the glacier front melted and receded, unconsolidated till, glacio-fluvial and glacio-lacustrine sediments were deposited. Till, a dense, non-stratified, heterogeneous mixture of sand, silt, clay, and gravel, was emplaced on top of bedrock as the advancing glaciers scraped, ground, crushed, and then deposited the material passively on bedrock as ablation till.

As streams of melt water flowed from the retreating glaciers, sediment from the melting ice was entrained, transported downstream, and deposited as well-sorted sand or gravel (glacio-fluvial deposits). Fine-grained silt and clay were transported by the streams into glacial lakes, where they were settled on the lake bottom (glacio-lacustrine deposits). The thickness of the glacial deposits is quite variable, although generally thin. They range from less than 10 ft in thickness at the higher elevations (nonexistent where bedrock is exposed) to more than 100 ft thickness in portions of the bedrock valleys (Rosenshein et al. 1968).

3.4.2 Site Geology

The results of the field investigations and previous investigations show that the shallow subsurface geology at the site is characterized by unconsolidated fine-grained sedimentary deposits. Figure 3-1 shows locations of cross sections A-A' and B-B'. Figures 3-2 and 3-3 depict Geologic Cross-Sections A-A' and B-B', respectively, which present the interpreted

generalized distribution and thickness of the shallow geological units identified at the site. Cross Section A-A' extends from the west (28-SB-01B) to the east (28-GW-08). Cross Section B-B' extends from the southwest (28-SB-16) to the northeast (28-GW-07), approximately along the interpreted direction of ground-water flow at the site. Soil boring logs for Review Item 28 are presented in: Appendix A-1 (EBS Phase II); Appendix B-1 (EBS Phase II Follow-On); and Appendix C-1 (EBS Phase II Follow-On Addendum II).

In general, the unconsolidated sedimentary deposits consist of the following (from shallow to deep):

- Silt to medium sand unit – This upper unit consists of a brown to dark gray silt to medium sand with minor amounts of gravel noted in several locations. The unit appears to consist of fill material placed during past construction activities.
- Fine to medium sand unit – This unit consists of a tan to dark brown to gray fine to medium sand containing local deposits of silt and/or gravel. Refuse material was noted in several borings in this layer that also may have been placed as part of past construction activities.
- Medium to coarse gravelly sand or peat unit – A medium to coarse gravelly sand unit was identified in the southern to central portion of the site and may represent native material. Further to the north, a variation of the first two units are underlain by an approximate 2 ft thick unit of organic material interpreted to be a layer of peat and part of the native material at the site. This layer may represent the original surface of the site prior to Naval construction activities. The peat unit is generally found from 28-SB-14 to 28-GW-07.
- Silt unit – In the northern portion of the site, a layer of black to dark gray silt to very fine sand with a minimum thickness of 2 ft is present below the peat layer.
- Very fine to fine sand – This unit in the northern portion of the site consists of gray to olive gray very fine to fine sand with local deposits of silt to coarse sand.
- Silt with trace clay – Beneath the medium to coarse gravelly sand in the central portion of the site lies a unit of black silt with trace clay, which is approximately 6 ft thick at 28-SB-14 to 28-SB-15.
- Coarse sand with gravel – At soil boring 28-SB-14, which was the deepest soil boring during this investigation, a 3 ft thick layer of brown coarse sand with coarse gravel was observed beneath the black silt with trace clay. This unit is at a depth of approximately 32 ft bgs.
- Black silt to medium sand – A layer of black silt to medium sand with minor coarse gravel/cobbles was observed beneath the coarse sand with gravel unit at 28-SB-14. This unit extends from approximately 35 ft bgs to the bottom of the soil boring at 44 ft bgs.

No geologic information was obtained below the fine to medium sand unit in the northern portion of the site (Figure 3-3). Refusal was encountered in the northern portion of the site at depths of 29 to 46 ft bgs.

3.5 HYDROGEOLOGY

3.5.1 Regional Hydrogeology

Ground water in Rhode Island is present in two general types of aquifers: unconsolidated Pleistocene glacial deposits and consolidated Paleozoic bedrock. The ground water within the glacial deposits is divided into two general hydrologic units; the stratified drift unit (glacio-fluvial deposits) and the till unit. The stratified drift unit consists of interbedded lenses of gravel, sand and silt. The till unit consists of boulders, gravel, sand, silt and clay. Both aquifers constitute important water resources for the state. Most domestic wells in Rhode Island obtain water from the bedrock aquifer (USGS 1988).

The quality of ground water in most of Rhode Island is suitable for human consumption with little or no treatment. Typically, the ground water has total dissolved solids concentrations less than 200 mg/L, is soft (hardness less than 60 mg/L of calcium carbonate), is slightly acidic (pH 5.5 to 7.0), and has a temperature of 10 to 12 °C. The percentage of the State's land with non-potable ground water is relatively small. Although many areas have measurable degradation of water quality, the amount of degradation has not impaired the water quality for human consumption and other major uses. Because the ground water occurs mostly under unconfined conditions with a depth to water less than 20 ft bgs, the ground water in Rhode Island is often vulnerable to contamination and quality degradation (USGS 1988).

3.5.2 Local Hydrogeology

NCBC Davisville lies within the Hunt River and Coastal drainage basins with all stream and river flow eventually discharging into Narragansett Bay. During most of the year, a part of the stream flow consists of water discharged from retention storage in natural and constructed impoundments. The remaining flow is from direct runoff of precipitation and from base flow runoff consisting largely of ground-water discharge.

As interpreted from water level measurements collected during a Basewide Ground-Water Study, the ground-water flow direction in this portion of Zone 3 is northeast toward Allen Harbor (Stone & Webster 1995). Based on water level data collected from piezometers during that study, the depth to ground water is approximately 10 to 11 ft bgs near 28-SB-16 (based on data from piezometer PGU-Z4-13) and approximately 5 to 6 ft bgs near 28-SB-20 (based on data from piezometer PGU-Z3-09). Depth to the water table continues to decrease further to the north until reaching Allen Harbor.

RIDEM has classified ground-water at this location as "GB" (assumed by RIDEM to require treatment prior to drinking).

4. INVESTIGATION RESULTS

This chapter presents the results of the investigations conducted at Study Area 16. As outlined in Section 2.12.3, the key screening criteria used to evaluate the data in this chapter are the RIDEM Residential Direct Soil Exposure Criteria, the RIDEM Industrial/Commercial Direct Soil Exposure Criteria, the RIDEM GB Leachability Criteria, the Federal MCL, and the Federal marine chronic AWQC because constituent concentrations above these criteria may drive regulatory actions. The EPA Region IX RBC and SSL DAF 20 were used if there were no RIDEM criterion for a given analyte.

4.1 PREVIOUS INVESTIGATIONS

4.1.1 Soil Removal Action

In 1992, Halliburton NUS completed a soil removal action in a spill area around the upended creosote dip tank. The removal action included four phases and was intended to remove soil containing elevated concentrations of PAH. During the first three phases of the removal action, PAH were detected in soil down to approximately 4 ft bgs. The final phase consisted of the excavation of a PAH "hot spot" in soil (not considered to be part of the release) located in the area of the upended tank. At that time, a "hot spot" was defined as soil boring sample concentrations that exceeded job-specific RCRA Media Cleanup Standards, based on a residential usage scenario. The conclusion of the Halliburton NUS report was that, although some PAH remained, the associated human health risk under a residential usage scenario (1.3×10^{-5}) was within EPA's acceptable target risk range (10^{-4} to 10^{-6}).

4.1.2 Phase II EBS Investigation

In Spring/Summer 1996, during the Phase II EBS (EA 1998a), soil borings 28-SB-01A through -01D (Figure 1-3) were installed in the northwest portion of the site investigated previously by Halliburton NUS. Soil samples were collected from 0 to 2 ft bgs and from 2 to 4 ft bgs at each location and were analyzed for PAH. The PAH detected in samples from the Phase II EBS Investigation are summarized in Table 4-1.

The evaluation of the resulting data during the Phase II EBS confirmed the presence of low concentrations of PAH in soil. In particular, the concentration of benzo(a)pyrene ($1,400 \text{ J } \mu\text{g/kg}$) in surface soil sample 28-SB-01B exceeded the RIDEM Industrial/Commercial Direct Soil Exposure Criterion ($800 \text{ } \mu\text{g/kg}$).

Evaluation of these data in accordance with the procedure outlined in Section 2.13.3 of this Comprehensive Report/SASE indicates that 1 of 4 surface soil samples and 2 of 4 subsurface soil samples contained benzo(a)pyrene above the RIDEM Industrial Direct Soil Exposure Criterion of $800 \text{ } \mu\text{g/kg}$. Although no RIDEM GB Leachability Criteria are available for PAH, benzo(a)anthracene ($2,700 \text{ J } \mu\text{g/kg}$) exceeded the DAF 20 criterion ($2,000 \text{ mg/kg}$) in 28-SB-01D-

2-4 (duplicate sample only). DAF I criteria were exceeded by benzo(a)anthracene (5 of 8 samples), benzo(b)fluoranthene (5 of 8 samples), benzo(a)pyrene (3 of 8 samples), indeno(1,2,3-cd)pyrene (1 of 8 samples), and dibenzo(a,h)anthracene (3 of 8 samples). RIDEM Residential Direct Soil Exposure Criteria were exceeded by benzo(a)anthracene (3 of 8 samples), chrysene (4 of 8 samples), benzo(b)fluoranthene (3 of 8 samples), benzo(k)fluoranthene (1 of 8 samples), benzo(a)pyrene (3 of 8 samples), and indeno(1,2,3-cd)pyrene (1 of 8 samples), dibenzo(a,h)anthracene (1 of 8 samples), and benzo(g,h,i)perylene (2 of 8 samples).

For Phase II EBS Review Item 85, EA installed two soil borings with continuous split barrels in the approximate location of the former tank on the southwest side of Building E-107, where previously elevated total VOC readings had been obtained by NUS. The 0 to 2-ft and 2 to 4-ft intervals from EBS-85-SB-1 and the 2 to 4-ft and 8 to 10-ft intervals from EBS-85-SB-02 were submitted to the laboratory for TCL VOC analyses. Acetone (non-detect to 63 $\mu\text{g}/\text{kg}$), 2-butanone (52-99 $\mu\text{g}/\text{kg}$), and toluene (non-detect to 36 $\mu\text{g}/\text{kg}$) were detected in the four soil samples collected for the investigation of this Review Item. The concentrations of acetone (63 $\mu\text{g}/\text{kg}$) and toluene (36 $\mu\text{g}/\text{kg}$) in sample EBS 85-SB-01 (0-2 ft) were below the RIDEM Residential and Industrial/Commercial Direct Soil Exposure Criteria. VOC concentrations were also below EPA and RIDEM soil leachability criteria. No further action was recommended for EBS Review Item 85.

4.1.3 Phase II EBS Follow-On Investigation

During Summer 1997, the Phase II EBS Follow-On Investigation (EA 1998b) included a review of low altitude oblique angle aerial photographs, installation of soil borings and test pits in the creosote dip tank area and the alleged FFTA, a magnetometer survey to assess whether USTs were still present in the ground west of and adjacent to Building E-107, test pit excavations to investigate the magnetic anomalies, and ground-water sampling at the FFTA.

The analytes detected in samples from the Phase II EBS Follow-On Investigation are summarized in Table 4-2. These data were compared to federal and state criteria (as outlined in Section 2.13.2) and are summarized below.

Ground-Water

- VOC were not detected in the ground-water sample (28-GW-01A) or duplicate (28-GW-01A-duplicate) at the suspected FFTA. The concentration of bis(2-ethylhexyl)phthalate (the only SVOC detected) was below the Federal MCL as well as the RIDEM Class GB ground-water criterion.

Surface Soil Samples (0 to 2 ft bgs)

- Constituent concentrations in surface soil samples were below RIDEM's Commercial/Industrial Direct Soil Exposure Criteria, the RIDEM Class GB Leachability Criteria, and the DAF 20 criteria.

- TPH concentrations in five surface soil samples (28-SB-06, -07, -08, -09, and -11) exceeded the respective RIDEM Residential Direct Soil Exposure Criterion.
- Concentrations of various VOC and SVOC in samples 28-SS-01, 28-SB-03, 28-SB-04, 28-SB-05, 28-SB-06, 28-SB-07 (and duplicate), 28-SB-08 (duplicate only), and 28-SB-14 exceeded the DAF 1 criteria. This included acetone, methylene chloride, carbazole, benzo(a)anthracene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene.

Subsurface Soil Samples (greater than 2 ft bgs)

- Concentrations of acetone exceeded the DAF-1 criterion in 5 of 16 subsurface soil samples. In sample 28-SB-06-8-10, acetone also exceeded the DAF-20 criterion.
- Otherwise, only 28-SB-08-2-4 contained constituents above any screening criteria. In 28-SB-08-2-4, DAF-1 were exceeded by concentrations of benzo(a)anthracene (200 J $\mu\text{g/kg}$) and benzo(b)fluoranthene (240 J $\mu\text{g/kg}$). In addition, TPH exceeded the RIDEM Residential Direct Soil Exposure Criterion (500 mg/kg) in 28-SB-08-2-4 (810 mg/kg).
- No constituents exceeded the RIDEM Industrial Direct Soil Exposure Criteria.

4.2 PHASE II EBS FOLLOW-ON ADDENDUM II

As described in Section 1.4, the objectives of the Phase II EBS Follow-On Investigation Work Plan Addendum II (EA 1998c) were addressed by collecting four subsurface soil samples, one surface soil sample, sixteen ground-water samples from eight locations, and one sample of a seep on the shore of Allen Harbor in the area of Building E-107. Samples were collected during Fall/Winter 1998.

4.2.1 Soil

A summary of detected analytes in the soil samples collected at Study Area 16 during the Phase II EBS Follow-On Addendum II investigation is presented in Table 4-3. These data were compared to federal and state criteria (as outlined in Section 2.13.2) and are summarized below.

Surface Soil

- Various inorganics and SVOC were detected in the one surface soil sample (28-SS-21). VOC, pesticides, and PCB were not detected in the surface soil sample.
- No analytes detected in the surface soil sample exceeded RIDEM Industrial/Commercial Direct Soil Exposure or DAF 20 Criteria.
- Only chromium (5.5 mg/kg), nickel (7.3 mg/kg), and arsenic (2.2 mg/kg) exceeded the DAF 1 criteria (2, 7, and 1 mg/kg, respectively). Nickel only slightly exceeded the criterion and, although the analysis was for total chromium, the DAF 1 criterion pertains to chromium VI only. The concentrations of chromium and arsenic were within the NCBC background levels for surface soil (ND to 9.6 mg/kg and 0.59 to 8.1 mg/kg, respectively). The detected

concentration of nickel slightly exceeded the NCBC background range for surface soil (ND to 5 mg/kg). The detected concentrations of SVOC did not exceed DAF 1 criteria.

- Only arsenic (2.2 mg/kg) slightly exceeded its RIDEM Residential Direct Soil Exposure Criterion (1.7 mg/kg); however, the concentration of arsenic was within NCBC background levels for surface soil. The detected concentrations of SVOC did not exceed RIDEM Residential Direct Soil Exposure Criteria.

Subsurface Soil

- Various inorganics (4 of 4 samples), VOC (1 of 4 samples), and TPH (1 of 4 samples) were detected in subsurface soil samples. SVOC, pesticides, and PCB were not detected in the subsurface soil samples. Of the VOC analyses, only a low concentration of acetone (20 $\mu\text{g/kg}$) was detected in one sample (28-SB-18-10-12).
- No analytes detected in subsurface soil samples exceeded RIDEM Industrial/Commercial Direct Soil Exposure Criteria.
- Only antimony in 28-SB-20-8-10 (6.4 J mg/kg) exceeded its DAF 20 criterion (5 mg/kg).
- Antimony (1 of 4 samples), arsenic (4 of 4 samples), barium (1 of 4 samples), cadmium (1 of 4 samples), chromium (4 of 4 samples), and nickel (3 of 4 samples) exceeded the DAF 1 criteria. Except for arsenic, these analytes also exceeded NCBC Davisville background concentration ranges for surface soil in one or more samples (subsurface background concentrations have not been determined). Although the analysis was for total chromium, the DAF 1 criterion pertains to chromium VI only. The detected concentrations of VOC and TPH did not exceed DAF 1 criteria.
- Arsenic (3 of 4 samples), beryllium (2 of 4 samples), and lead (1 of 4 samples) exceeded their respective RIDEM Residential Direct Soil Exposure Criteria. Of these detected concentrations, only lead (339 mg/kg) in 28-SB-20-8-10 exceeded NCBC Davisville background concentration ranges for surface soil (53.8 mg/kg). The detected concentrations of VOC and TPH did not exceed RIDEM Residential Direct Soil Exposure Criteria.

4.2.2 Ground Water and Seep Water

A summary of detected analytes in the ground-water and seep samples collected at Study Area 16 during the Phase II EBS Follow-On Addendum II investigation is presented in Table 4-4. These data were compared to federal and state criteria (as outlined in Section 2.13.2) and are summarized below.

Seep

- Various inorganics, SVOC, and pesticides were detected in the seep sample. VOC were not detected in the seep sample.
- Lead (29.3 $\mu\text{g/L}$), dieldrin (0.2 $\mu\text{g/L}$), endrin (0.0039 J $\mu\text{g/L}$), heptachlor epoxide (0.2 J $\mu\text{g/L}$), and phenanthrene (7 $\mu\text{g/L}$) exceeded the marine chronic AWQC.

Ground Water

- Various VOC (13 of 16 samples), SVOC (4 of 16 samples), pesticides (8 of 16 samples), and inorganics (16 of 16 samples) were detected in ground-water samples.
- The detected concentration of trichloroethene (TCE) (570 $\mu\text{g/L}$) only slightly exceeded the RIDEM GB Ground-Water criteria (540 $\mu\text{g/L}$) in only 1 of 16 samples.
- TCE and vinyl chloride concentrations exceeded MCL in 4 of 16 samples and 5 of 16 samples, respectively. TCE concentrations ranged from non-detect to 570 $\mu\text{g/L}$ (as compared to an MCL of 5 $\mu\text{g/L}$). Vinyl chloride concentrations ranged from non-detect to 10 $\mu\text{g/L}$ (as compared to an MCL of 2 $\mu\text{g/L}$).

5. CONCLUSIONS AND RECOMMENDATIONS

This SASE report summarizes the findings of four Navy investigations conducted at IR Program Study Area 16, which has been designated the Creosote Dip Tank and Fire Fighting Training Area. In 1992, Halliburton NUS conducted a removal action at an upended tank in an area where creosote dipping reportedly took place. The Study Area was expanded and further investigated by EA as part of the EBS program in the Phase II EBS, Phase II EBS Follow-On, and Phase II EBS Follow-On Addendum II investigations. Data were compared to risk-based and regulatory screening criteria to determine whether the property could be approved for unrestricted residential or commercial/industrial use. Based on the findings of these studies, EA recommends that the Navy conduct a Remedial Investigation to further assess CVOCs in site ground water.

5.1 CONCLUSIONS

Figures 5-1 through 5-5 summarize the chemical constituents detected in soil, ground-water, and seep samples at concentrations that exceed the key screening criteria, as outlined in Section 2.12.3. The key screening criteria used to summarize the results are the RIDEM Residential Direct Soil Exposure Criteria, the RIDEM Industrial/Commercial Direct Soil Exposure Criteria, the RIDEM GB Leachability Criteria, and the Federal MCL and AWQC because constituent concentrations above these criteria may drive regulatory actions. The EPA Region IX RBC and SSL DAF-20 criteria were used if there was not a RIDEM criterion for a given analyte. Figures 5-1 through 5-5 include data from the Phase II EBS, Phase II EBS Follow-On, and Phase II EBS Follow-On Addendum II investigations.

5.1.1 Soil

- As shown in Figure 5-1, various SVOC (primarily PAH) and inorganic constituents (arsenic, lead, and beryllium) were detected in soil samples at concentrations exceeding the RIDEM Residential Direct Soil Exposure Criteria or EPA Region IX Residential RBC. The PAH were detected in soil at the original Creosote Dip Tank Area. The inorganics were detected in four samples located throughout the site.
- As shown in Figure 5-2, only one constituent [benzo(a)pyrene – maximum concentration of 2,700 ug/kg] detected in soil samples exceeded the RIDEM Industrial/Commercial Direct Soil Exposure Criteria or EPA Region IX Industrial RBC at Study Area 16. The elevated concentrations of benzo(a)pyrene were detected at two locations (28-SB-01A and 28-SB-01D) within the original Creosote Dip Tank Area.
- As shown in Figure 5-3, three constituents detected in soil samples exceeded the RIDEM GB Leachability Criteria or SSL DAF-20 criteria at Study Area 16. This included benzo(a)anthracene (2,700 J ug/kg) in 28-SB-01D-2-4, acetone (75,000 J ug/kg) in 28-SB-06-8-10, and antimony (6.4 J mg/kg) in 28-SB-20-8-10.

- Results from soil samples collected at locations where solid waste-type debris had been noted in test pits or soil borings were comparable to other soil results in the study area. Significant impact to soil from this debris was not identified.

5.1.2 Ground Water

- As shown in Figure 5-4, only TCE detected in the deep ground-water sample from 28-GW-04 exceeded RIDEM's GB Ground-Water Objective.
- As shown in Figure 5-5, five of the eight ground-water sampling locations included within the Phase II EBS Follow-On Addendum II Investigation contained TCE and/or vinyl chloride concentrations above Federal MCL. Concentrations of both TCE and vinyl chloride were highest (570 J and 10 ug/L, respectively) within the paved area suspected to be the location of the former FFTA (at 28-GW-04). Given the variations in the elevations at which ground-water samples were collected, however, the shape or extent of the area impacted by chlorinated VOC cannot be determined from the available data.

5.1.3 Seep

- As shown in Figure 5-4, lead, dieldrin, endrin, heptachlor epoxide, and phenanthrene were detected in the seep sample collected east of Building E-107 at concentrations above marine chronic AWQC. Except for phenanthrene, the concentrations were higher in the seep sample 28-SP-1 than in the sample from upgradient ground-water location 28-GW-07. Therefore, the constituents detected in 28-SP-01 may be from a source other than Study Area 16 ground water. Based on the Draft Final Marine Ecological Risk Assessment (EA 1996) for Allen Harbor, potential offsite sources may exist including the two marinas and storm water outfalls from nearby parking lots.

5.1.4 UST Area/Septic Tanks

- In the former UST area west and south of Building E-107, an extensive program of excavation in the areas of detected magnetic anomalies uncovered no evidence of remaining USTs.
- The two steel pontoon tanks adjacent to Building E-107 were cleaned and removed. TPH-impacted soil surrounding the pontoon tanks was also removed. A total of 274 tons of soil was removed during excavation activities and the two pontoon tanks were sent offsite for metal recycling. Final confirmatory samples in this area were below RIDEM Industrial Direct Soil Exposure Criteria. Closure reports have been finalized for the UST area and the pontoon tanks (FWENC 1998a, 1998b).

5.2 RECOMMENDATIONS

EA recommends that a Remedial Investigation focused on ground water be conducted at Study Area 16. The RI should address the following objectives.

- Characterize the hydrogeology (stratigraphy and ground-water flow conditions) at the site;
- Further evaluate the horizontal and vertical extent of the CVOCs in ground water;
- Identify the source of CVOC in ground water; and
- Evaluate risk to human health from site constituents.

Additional remedial action is not anticipated for soil, based on the low number and distribution of exceedences of residential or commercial/industrial screening criteria. However, the available soil data should be evaluated using a tiered, streamlined risk assessment approach to ensure protection of human health under the most likely exposure scenarios.

An additional recommendation from EPA and the Technical Advisory Group (TAG) is to include an evaluation of risk to the environment from site constituents. An additional recommendation from the TAG is to include SVOC and metals to the analytical program for soil and ground-water samples. The EPA also recommended that at least the first round of soil and ground-water samples be analyzed for the full TCL/TAL constituents during the RI. An additional recommendation from RIDEM is to include further assessment of the site soils in the RI.

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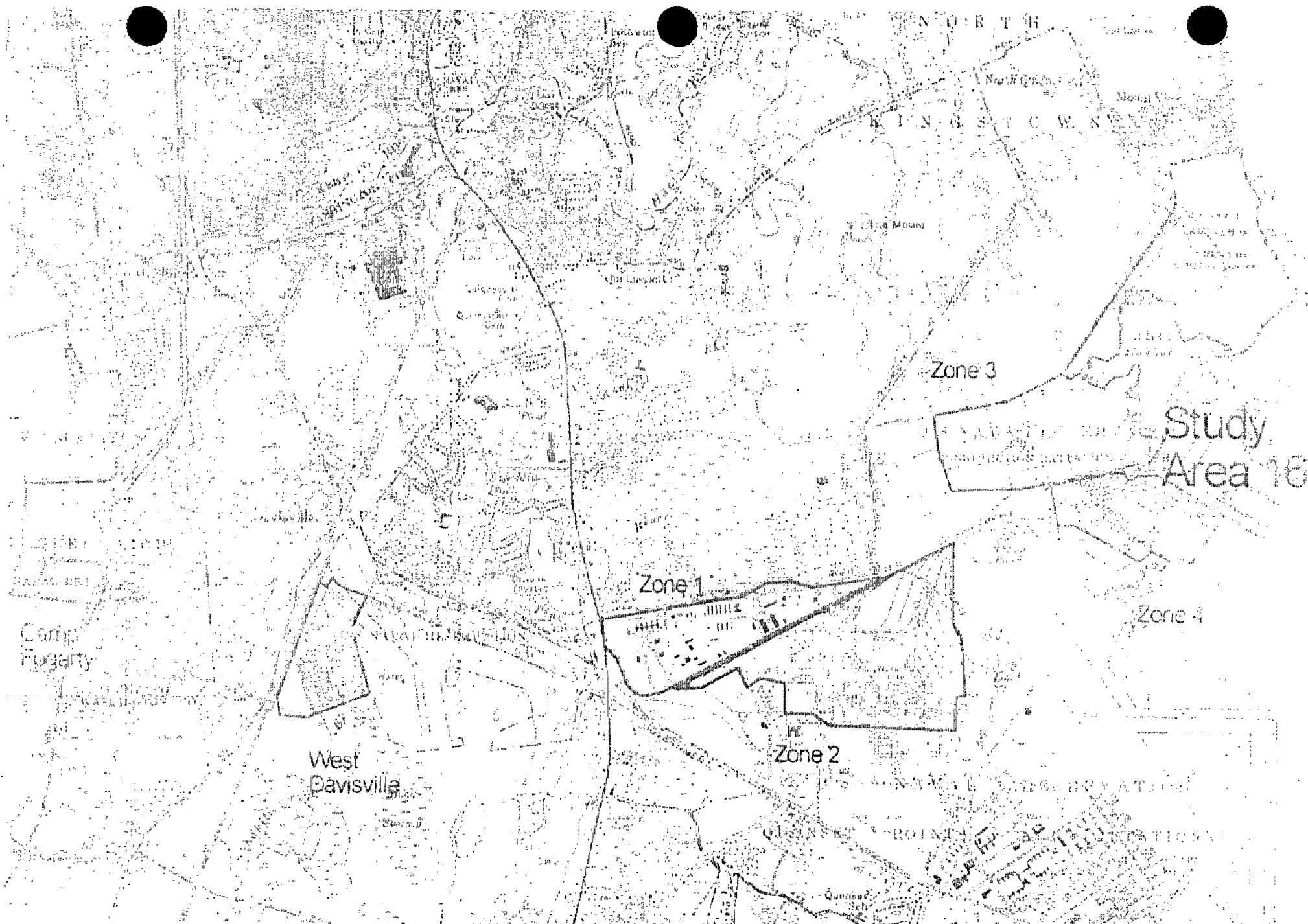
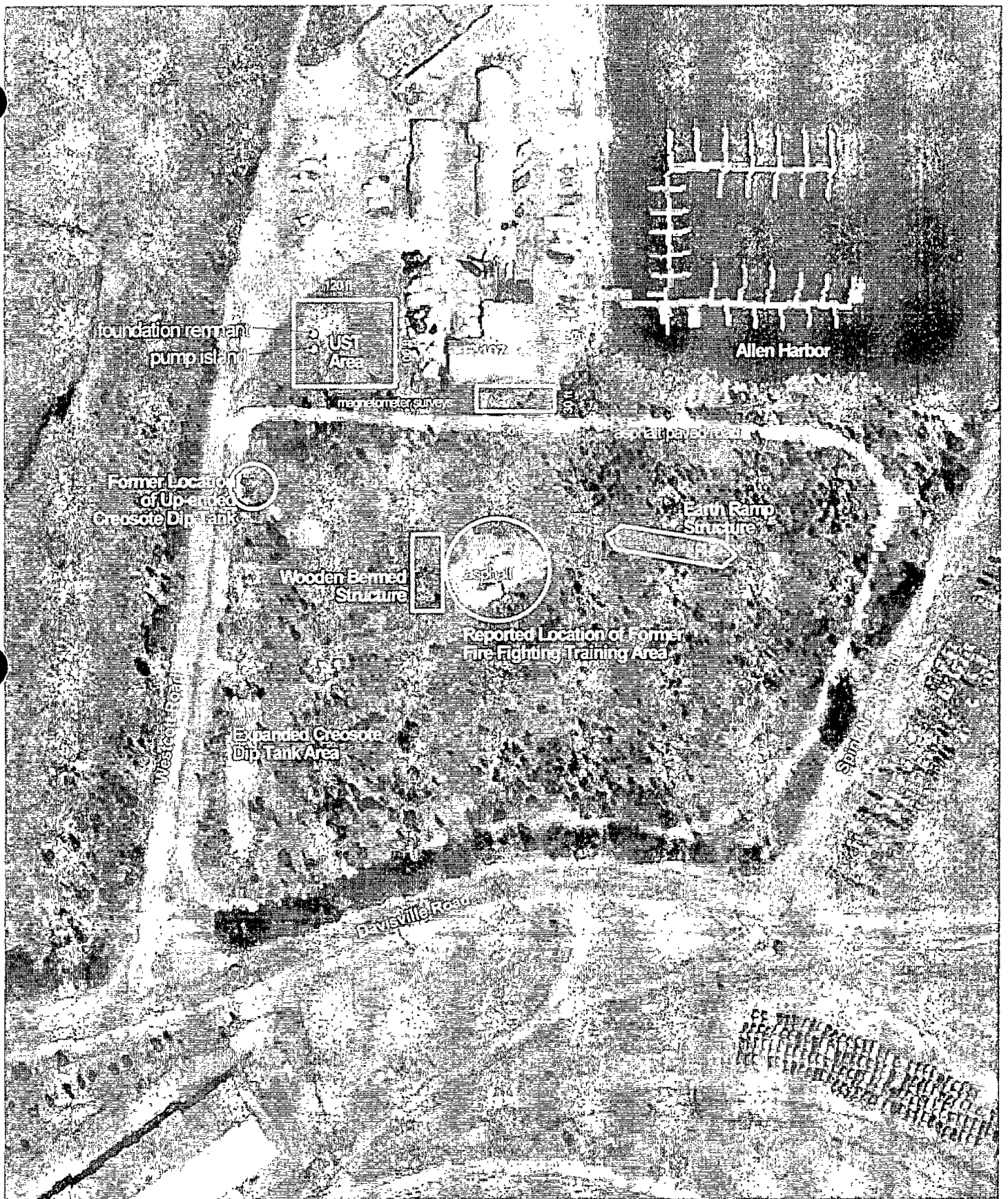
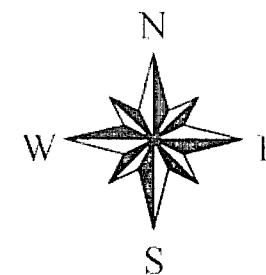


FIGURE 1-1
SITE LOCUS MAP - NCBC DAVISVILLE, RI



200 0 200 400 Feet

Figure 1-2
Site Map, Study Area 16



LEGEND:

- = soil sampling location
- = Ground-water sampling location
- = Seep sampling location
- = Test Pit sampling location

Notes:

Sample locations for Phase II EBS, Phase II EBS Follow-On, and Phase II EBS Follow-On Addendum II investigations

Aerial Photograph, flown 4/11/95
Scale 1:5,400
Rectified by Geofields, Inc.



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STUDY AREA 16 NCBC DAVISVILLE

Figure 1-3: Ground-water, Seep, Test Pit, and Soil Sampling Locations

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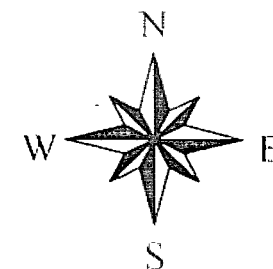
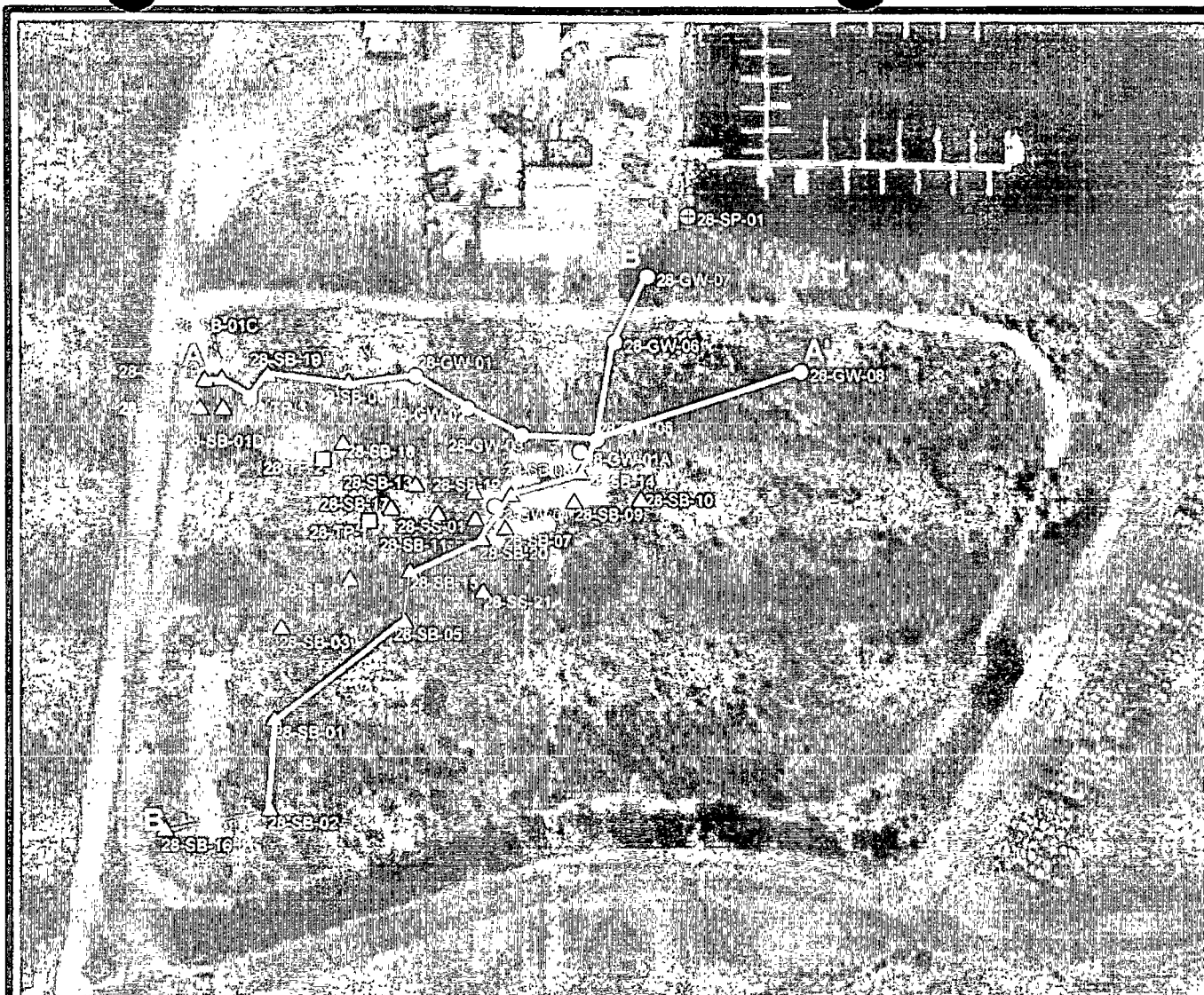
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DATE
04 MAY 99

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29600.60

FILE No.
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LEGEND:

- = soil sampling location
- = Ground-water sampling location
- = Seep sampling location
- = Test Pit sampling location
- = Geologic Cross-section

Notes:

Sample locations for Phase II EBS, Phase II EBS Follow-On, and Phase II EBS Follow-On Addendum II investigations

Aerial Photograph, flown 4/11/95
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Figure 3-1: Location of Geologic Cross-Sections

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LEGEND

GW Samples
10-12 ft bgs
23-25 ft bgs

Ground-water Sampling
Interval Depth Below Ground
Surface

SAMPLING LOCATION

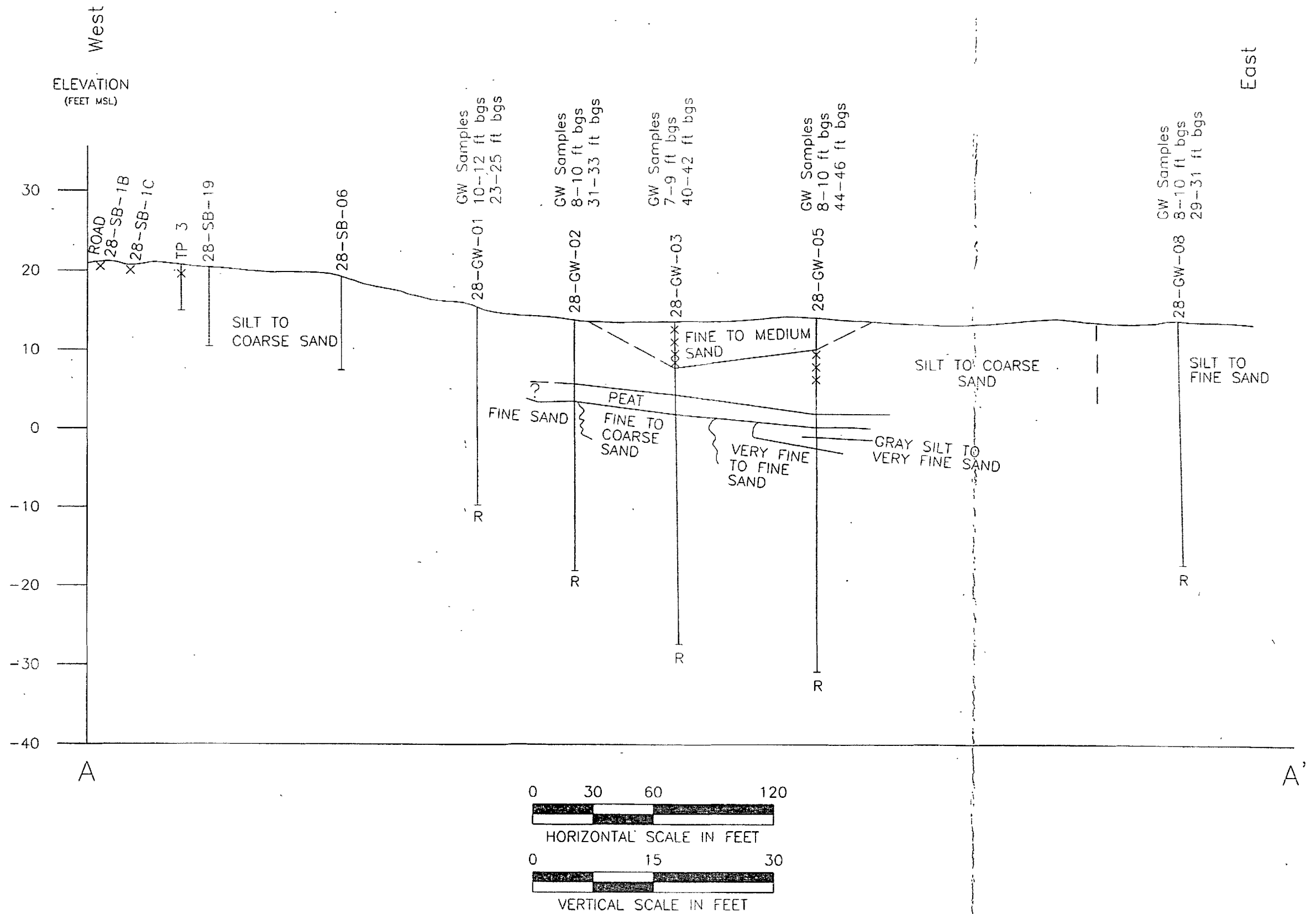
GROUND SURFACE

DEBRIS/FILL NOTED IN BORING LOGS

REFUSAL

NOTES

THE SUBSURFACE SECTIONS SHOWN
REPRESENT OUR EVALUATION OF THE
MOST PROBABLE CONDITIONS BASED ON
INTERPRETATION OF PRESENTLY AVAILABLE
DATA. SOME VARIATIONS FROM THESE
CONDITIONS MUST BE EXPECTED.



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NCBC DAVISVILLE, RHODE ISLAND

FIGURE 3-2
GEOLOGIC
CROSS-SECTION A-A'

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CHECKED BY
JN/JS

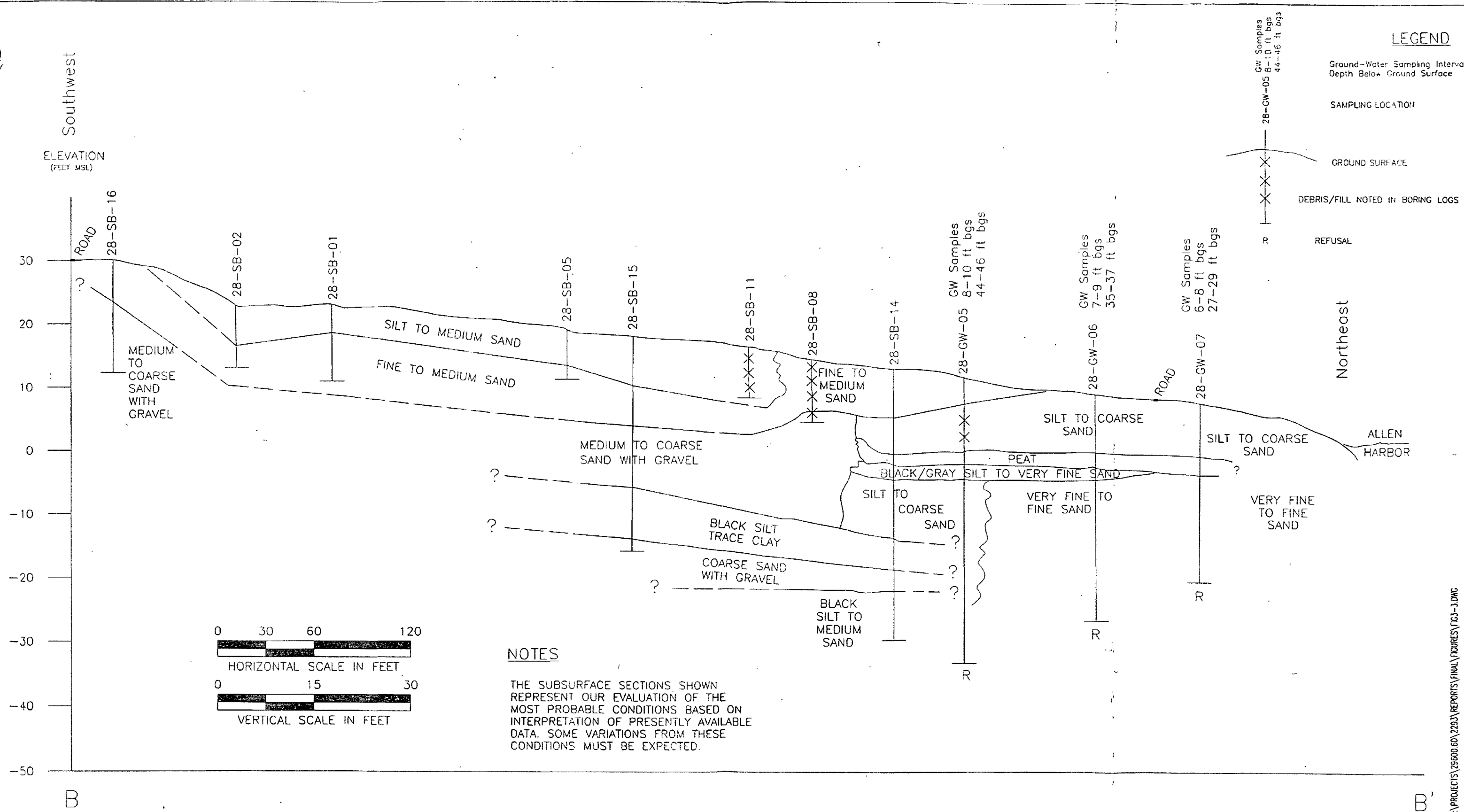
DRAWN BY
BT
PROJECT MGR.
JC

DATE
12/28/99
SCALE
AS SHOWN

PROJECT NO.
29600.60
DRAWING NO.

FILE NAME
FIG. 3-2
FIGURE
3-2

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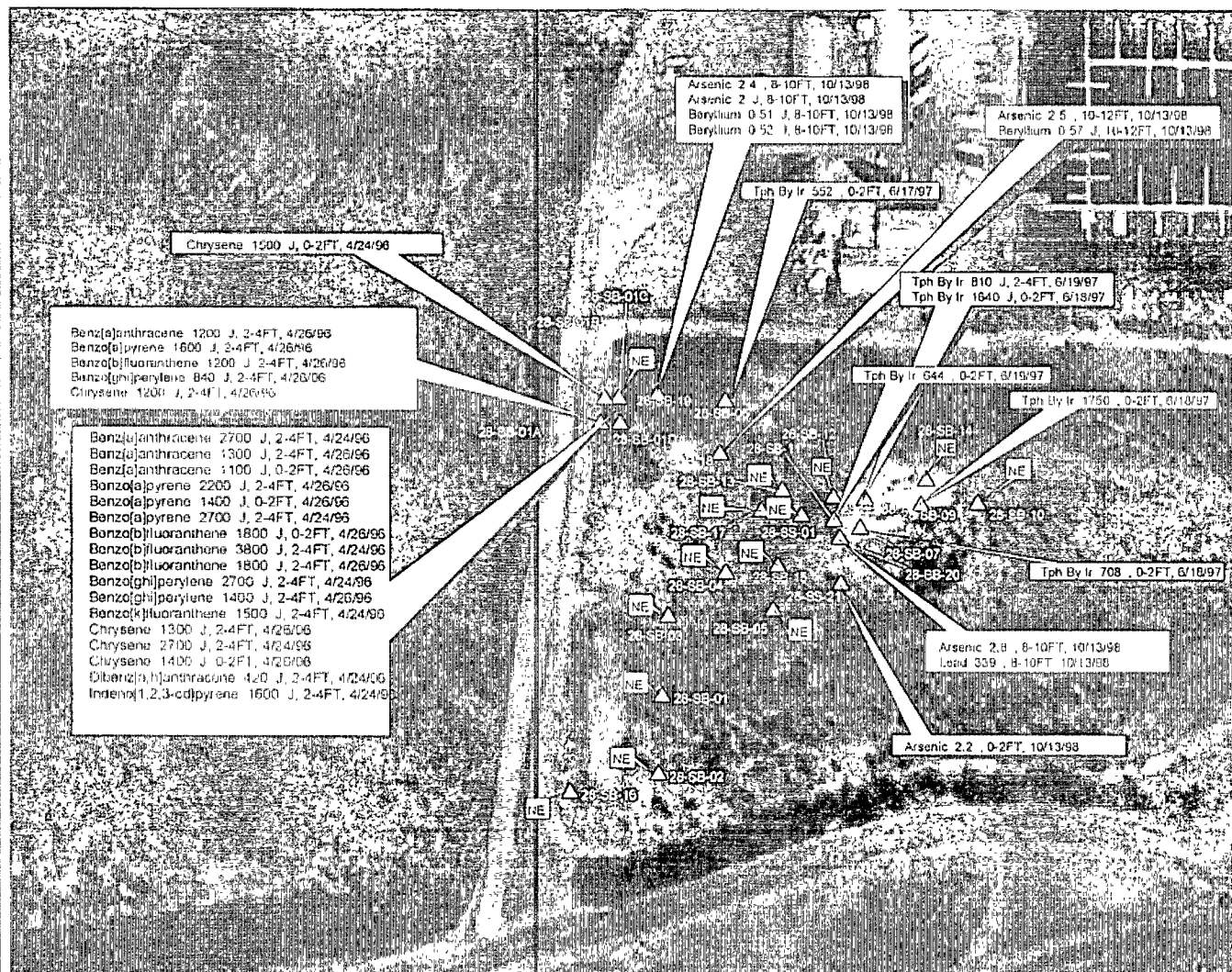
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STUDY AREA 16
NCBC DAVISVILLE, RHODE ISLAND

FIGURE 3-3
GEOLOGIC
CROSS-SECTION B-B'

DESIGNED BY PWH/JN	DRAWN BY BT	DATE 12/28/99	PROJECT NO. 29600.60	FILE NAME FIG. 3-3
CHECKED BY JN/JS	PROJECT MGR. JC	SCALE AS SHOWN	DRAWING NO.	FIGURE 3-3

FILE: F:\PROJECTS\29600.60\2293\REPORTS\FINAL\FIGURES\FIG3-3.DWG



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Figure 5-1: Constituents Exceeding RIDEM
Residential Direct Exposure
Criteria in Soil Samples

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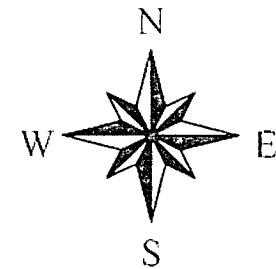
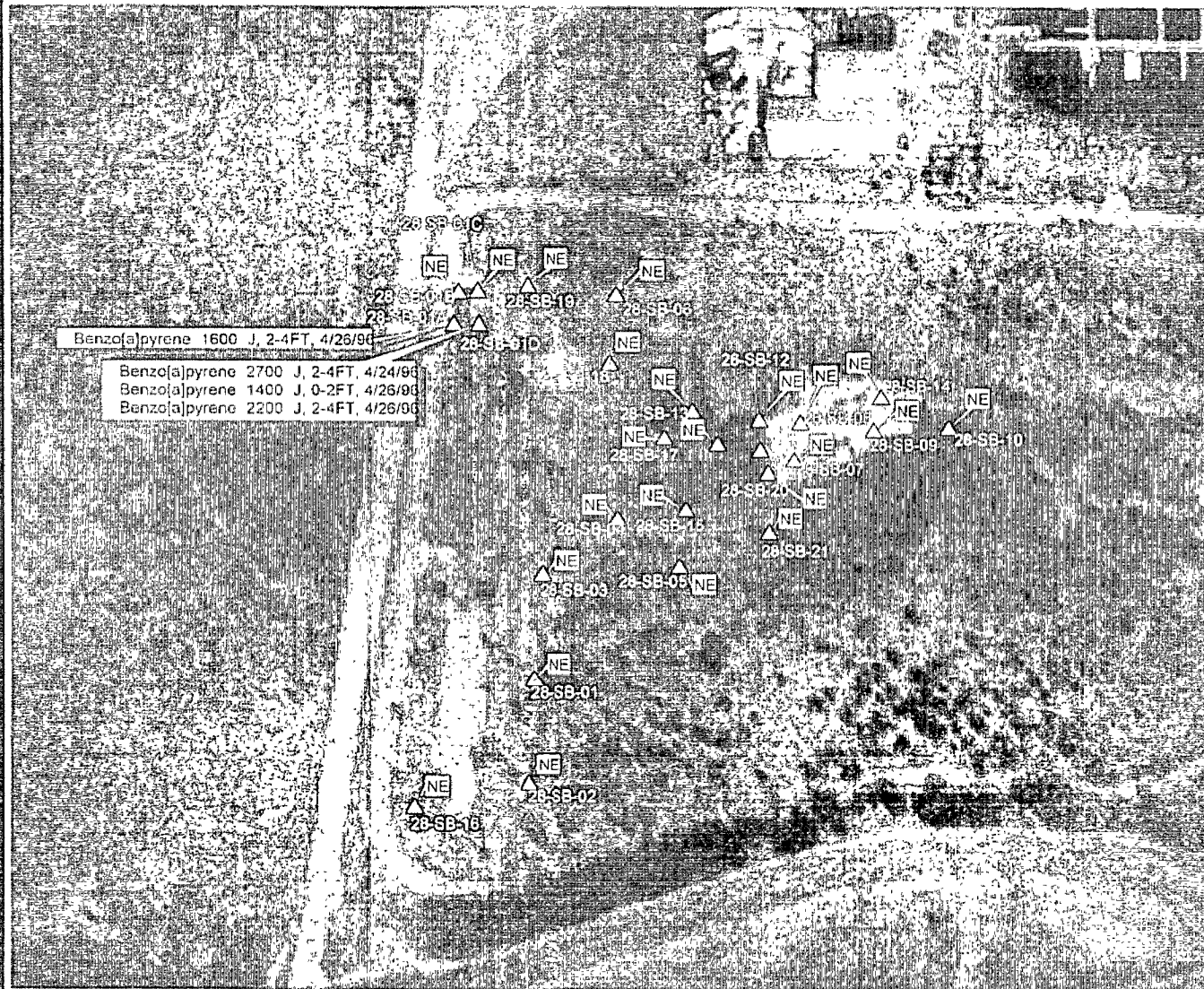
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JMC

SCALE 80 0 80 160 Feet

DATE
07 MAY 99

PROJECT NO
29600.60

FILE No.
CTO60.apr



LEGEND:

△ = soil sampling location

Notes:

Displayed values reported as:
Analyte, data and qualifier,
sample depth, sample date
(concentration units = ug/kg)

Region 9 RBC used if RIDEM
Industrial Direct Exposure
Criteria not available.

NE = Not Exceeded

Sample data for Phase II EBS,
Phase II EBS Follow-On, and
Phase II EBS Follow-On
Addendum II investigations

Aerial Photograph, flown 4/11/95
Scale 1:5,400
Rectified by Geofields, Inc.



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STUDY AREA 16 NCBC DAVISVILLE

Figure 5-2: Constituents Exceeding
RIDEM Industrial Direct
Exposure Criteria in Soil
Samples

PROJECT MGR
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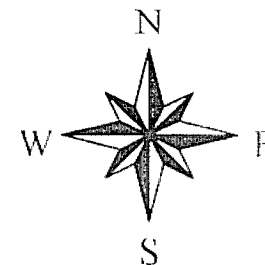
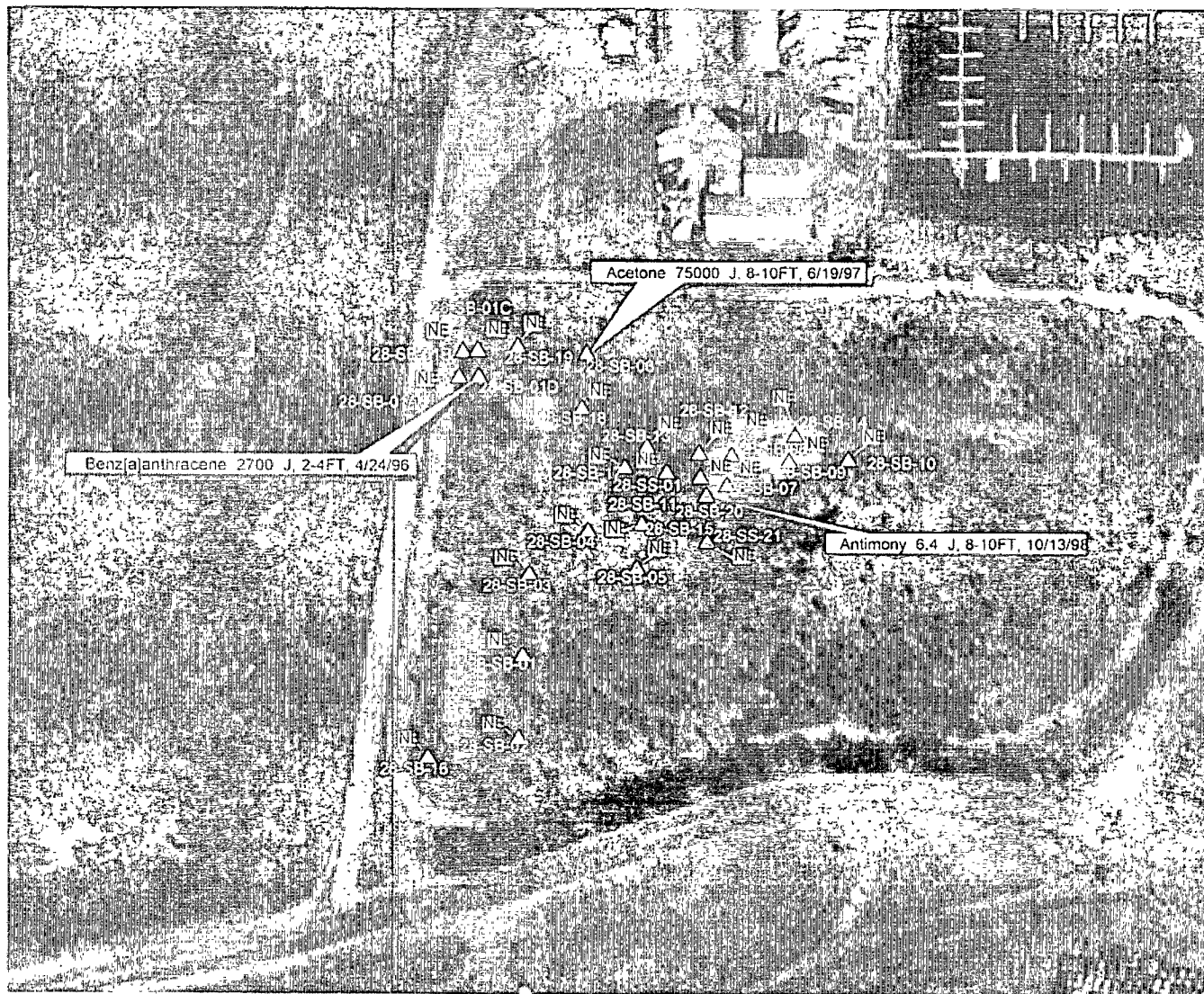
CHECKED BY
JMC

SCALE 60 0 60 120 Feet

DATE
05 MAY 99

PROJECT NO
29600.60

FILE No.
CTO60.apr



LEGEND:

= soil sampling location

Notes:

Displayed values reported as:
Analyte, data and qualifier,
sample depth, sample date

metals units = mg/kg
organics units = ug/kg

DAF 20 criteria were used if
GB Leachability Criteria were
not available.

NE = Not Exceeded

Sample locations for Phase II EBS,
Phase II EBS Follow-On, and
Phase II EBS Follow-On
Addendum II investigations

Aerial Photograph, flown 4/11/95
Scale 1:5,400
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STUDY AREA 16 NCBC DAVISVILLE

Figure 5-3: Constituents Exceeding
RIDEM GB Leachability
Criteria in Soil Samples

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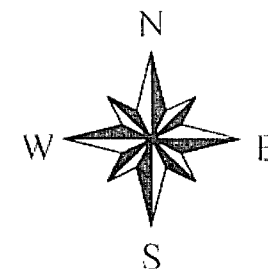
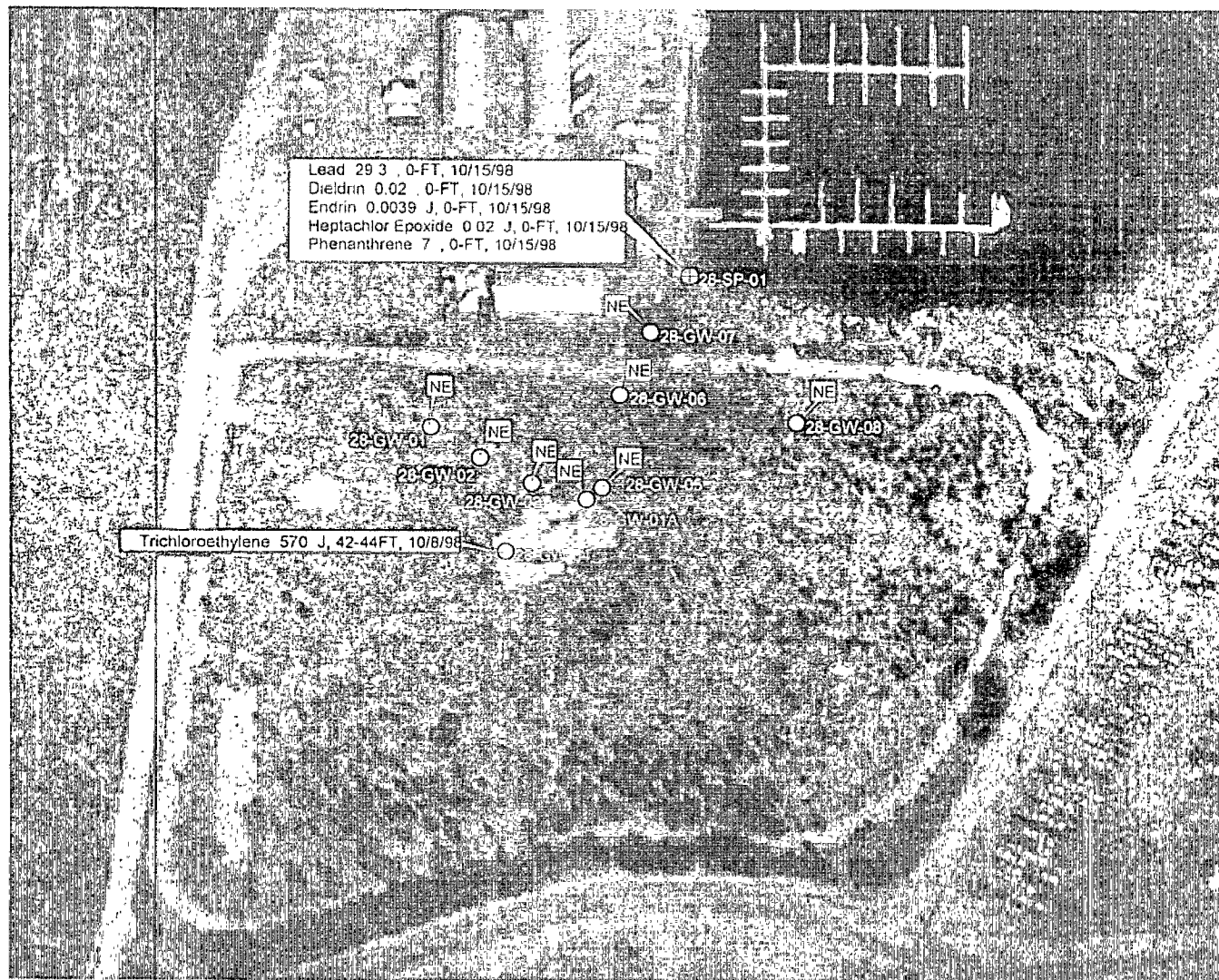
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SCALE 50 0 50 100 Feet

DATE
07 MAY 99

PROJECT NO
29600.60

FILE No
CTO60.apr



LEGEND:

() = Ground-water sampling location

(+) = Seep sampling location

Notes:

Displayed values reported as:
Analyte, data and qualifier,
sample depth, sample date
(concentration units = ug/L)

NE = Not Exceeded

Sample data for Phase II EBS,
Phase II EBS Follow-On, and
Phase II EBS Follow-On
Addendum II investigations

Aerial Photograph, flown 4/11/95
Scale 1:5,400
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STUDY AREA 16 NCBC DAVISVILLE

Figure 5-4: Constituents Exceeding
RIDEM GB Objectives in
Ground-water Samples and
AWQC in Seep Samples

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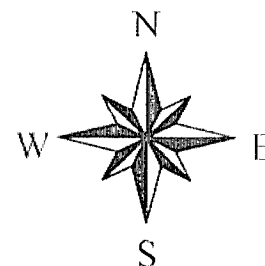
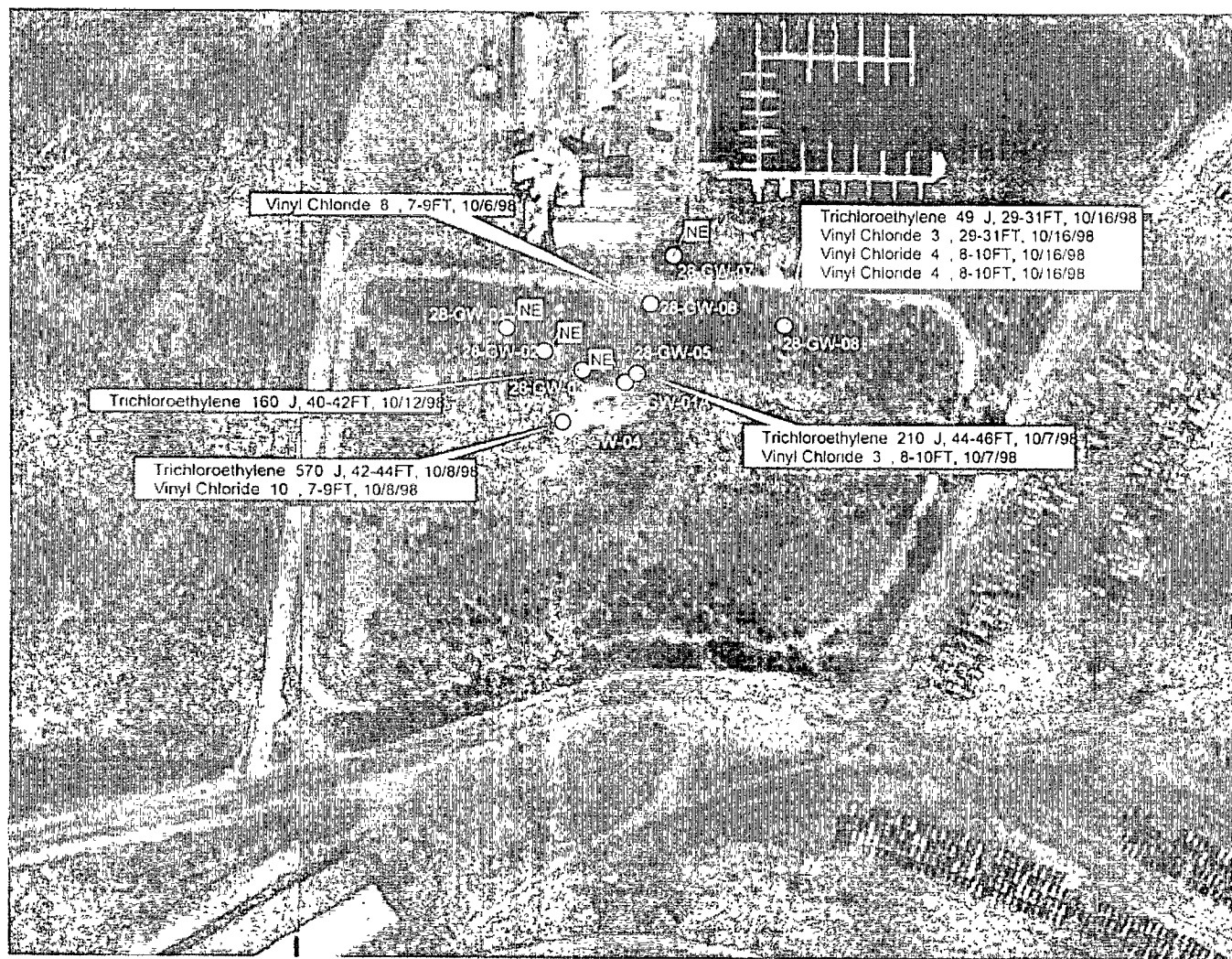
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SCALE 60 0 60 120 Feet

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29600.60

FILE No.
CTO60.apr



LEGEND:

● = Ground-water sampling location

Notes:

Displayed values reported as:
 Analyte, data and qualifier,
 sample depth, sample date
 (concentration units = ug/L)

NE = Not Exceeded

Sample data for Phase II EBS,
 Phase II EBS Follow-On, and
 Phase II EBS Follow-On
 Addendum II investigations

Aerial Photograph, flown 4/11/95
 Scale 1:5,400
 Rectified by Geofields, Inc.



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STUDY AREA 16 NCBC DAVISVILLE

Figure 5-5: Constituents Exceeding
 Federal MCL in
 Ground-water samples

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 JMC

SCALE 90 0 90 180 Feet

DATE
 05 MAY 99

PROJECT NO
 29600.60

FILE No.
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Table 2-1
Summary of Analytical Program
NCBC Davisville, RI

Description	Sample Matrix	No. of Locations	TPH 418.1	TPH-GRO 8015 Mod	TCL VOC CLPOLM01.8	TCL SVOC CLPOLM01.8	Pesticides OLM03.2	PCB OLM03.2	TAL Metals OLM04.0
Phase II EBS	Soil (surface and subsurface)	4				8			
Phase II EBS Follow-On	Soil (surface and subsurface)	18	33	7	33	33			
	Ground Water	1			1	1			
Phase II EBS Follow-On Addendum II	Soil (surface and subsurface)	5	5	5	5	5	5	5	5
	Ground Water	8			16	16	16		16
	Seep	1			1	1	1		1
Total Field Samples		37	38	12	56	64	22	5	22

note: totals do not include QA/QC samples.

Table 2-2
Volatile Organic Compounds (VOC) Screening Criteria
NCBC Davisville, Rhode Island

COMPOUND	RIDEM Criteria (a)						EPA SDWA MCL (mg/L)	EPA Soil Screening Guidance Document (b) (mg/kg)		EPA Region IX Screening Criteria (c)	
	Direct Exposure (mg/kg)		Leachability		Ground-Water Objectives			Generic SSL for Transfers from Soil to Ground Water (DAF20)	Generic SSL for Transfers from Soil to Ground Water (DAF1)	Preliminary Remedial Goals (RBC)	
	Residential	Industrial/ Commercial	Class GA mg/kg	Class GB mg/kg	Class GA mg/L	Class GB mg/L				Residential Soil (mg/kg)	Industrial Soil (mg/kg)
Chloromethane	--	--	--	--	--	--	--	--	--	1.2	2.6
Bromomethane	0.8	2900	--	--	--	--	--	--	--	6.8	23
Vinyl Chloride	0.02	3	0.3	--	0.002	--	0.002	0.01	0.0007	0.016	0.035
Chloroethane	--	--	--	--	--	--	--	--	--	--	--
Methylene Chloride	45	760	--	--	0.005	--	0.005	0.02	0.001	7.8	18
Acetone	7,800	10,000	--	--	--	--	--	16	0.8	2100	8800
Carbon Disulfide	--	--	--	--	--	--	--	32	2	7.5	24
1,1-Dichloroethene	0.2	9.5	0.7	0.7	0.007	0.007	0.007	0.06	0.003	0.037	0.08
1,2-Dichloroethane	920	10,000	--	--	0.005	--	--	23	1	500	1700
cis-1,2-Dichloroethene	630	10,000	1.7	60	0.07	2.4	0.07	0.4	0.02	31	100
trans-1,2-Dichloroethene	1,100	10,000	3.3	92	0.1	2.8	0.1	0.7	0.03	78	270
1,2-Dichloroethene (mixture)	--	--	--	--	--	--	--	--	--	35	120
Chloroform	1.2	940	--	--	--	--	0.1 (j)	0.6	0.03	0.25	0.53
1,2-Dichloroethane	0.9	63	0.1	2.3	--	0.11	0.005	0.02	0.001	0.25	0.55
2-Butanone (d)	10,000	10,000	--	--	--	--	--	--	--	7100	27000
1,1,1-Trichloroethane	540	10,000	11	160	0.2	3.1	0.2	2	0.1	1200	3000
Carbon Tetrachloride	1.5	44	0.4	5	0.005	0.07	0.005	0.07	0.003	0.23	0.5
Bromodichloromethane	10	92	--	--	--	--	0.1 (j)	0.6	0.03	0.63	1.4
Dibromochloropropane (DBCP)	0.5	4.1	--	--	0.0002	0.002	0.0002	--	--	--	--
Ethylene dibromide (EDB) (e)	0.01	0.07	0.0005	--	0.00005	--	0.00005	--	--	0.0049	0.02
Isopropyl benzene (f)	27	10,000	--	--	--	--	--	--	--	19	62
Methyl-tert-butyl-ether (MTBE)	390	10,000	0.9	100	0.04	5	--	--	--	--	--
1,1,1,2-Tetrachloroethane	2.2	220	--	--	--	--	--	--	--	2.4	5.4
1,2-Dichloropropane	1.9	84	0.1	70	0.005	3	0.005	0.03	0.001	0.31	0.68
cis-1,3-Dichloropropene (g)	--	--	--	--	--	--	--	0.004	0.0002	0.25	0.55
trans-1,3-Dichloropropene (g)	--	--	--	--	--	--	--	0.004	0.0002	0.25	0.55
Trichloroethene (TCE)	13	520	0.2	20	0.005	0.54	0.005	0.06	0.003	3.2	7
Dibromochloromethane (h)	7.6	68	--	--	--	--	0.1 (j)	0.4	0.02	5.3	23
1,1,2-Trichloroethane	3.6	100	0.1	--	0.005	--	0.005	0.02	0.0009	0.65	1.5
Benzene	2.5	200	0.2	4.3	0.005	0.14	0.005	0.03	0.002	0.63	1.4
Bromoform	81	720	--	--	--	--	0.1 (j)	0.8	0.04	56	240
4-Methyl-2-Pentanone (i)	1,200	10,000	--	--	--	--	--	--	--	770	2800
2-Hexanone (j)	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene (PCE)	12	110	0.1	4.2	0.005	0.15	0.005	0.06	0.003	5.4	17
1,1,2,2-Tetrachloroethane	1.3	29	--	--	--	--	--	0.003	0.0002	0.45	1.1
Toluene	190	10,000	32	54	1	1.7	1	12	0.6	790	880
Chlorobenzene	210	10,000	3.2	100	0.1	3.2	--	1	0.07	65	220
Ethylbenzene	71	10,000	27	62	0.7	1.6	0.7	13	0.7	230	230
Styrene	13	190	2.9	64	0.1	2.2	0.1	4	0.2	680	680
Xylene (total)	110	10,000	540	--	10	--	10	190	9	320	320

(a) RIDEM Remediation Regulations, as amended August 1996

(e) a.k.a. 1,2-dibromoethane reported MCL

(h) a.k.a. chlorodibromomethane

(b) EPA, May 1996

(f) a.k.a. cumene

(i) a.k.a. methyl isobutyl ketone

(c) EPA Region IX, May 1998

(g) one result reported for these isomers

(j) a.k.a. butyl methyl ketone

(d) a.k.a. methyl ethyl ketone

SSL = Soil Screening Level

DAF = Dilution Attenuation Factor

-- = no criterion provided

Table 2-3
Semi-Volatile Organic Compounds (SVOC) Screening Criteria
NCBC Davisville, Rhode Island

COMPOUND	RIDEM Criteria (a)						EPA SDWA MCL (mg/L)	EPA Soil Screening Guidance Document (b) (mg/kg)		EPA Region IX Screening Criteria (c)	
	Direct Exposure (mg/kg)		Leachability		Ground-Water Objectives			Generic SSL for Transfers from Soil to Ground Water (DAF20)	Generic SSL for Transfers from Soil to Ground Water (DAF1)	Preliminary Remedial Goals (RBC)	
	Residential	Industrial/ Commercial	Class GA (mg/kg)	Class GB (mg/kg)	Class GA (mg/L)	Class GB (mg/L)				Residential Soil (mg/kg)	Industrial Soil (mg/kg)
Phenol	6,000	10,000	--	--	--	--	--	100	5	39,000	100,000
bis(2-Chloroethyl)ether	0.6	5.2	--	--	--	--	--	0.0004	2.00E-05	0.043	0.097
2-Chlorophenol	50	10,000	--	--	--	--	--	4	0.2	91	370
1,2-Dichlorobenzene (o-DCB)	510	10,000	41	--	0.6	--	0.6	17	0.9	700	700
1,3-Dichlorobenzene (m-DCB)	430	10,000	41	--	0.6	--	--	--	--	500	860
1,4-Dichlorobenzene (p-DCB)	27	240	41	--	0.075	--	0.075	2	0.1	3.6	8.5
2,2'-oxybis(1-Chloropropane)	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	--	--	--	--	--	--	--	15	0.8	3,300	34,000
3-Methylphenol	--	--	--	--	--	--	--	--	--	3,300	34,000
4-Methylphenol	--	--	--	--	--	--	--	--	--	330	3,400
N-Nitroso-di-n-propylamine	--	--	--	--	--	--	--	5.00E-05	2.00E-06	0.063	0.27
Hexachloroethane	46	410	--	--	--	--	--	0.5	0.02	32	140
Nitrobenzene	--	--	--	--	--	--	--	0.1	0.007	18	94
Isophorone	--	--	--	--	--	--	--	0.5	0.03	470	2,000
2-Nitrophenol	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	1,400	10,000	--	--	--	--	--	9	0.4	1,300	14,000
bis(2-Chloroethoxy)methane	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	30	6,100	--	--	--	--	--	1	0.05	200	2,000
1,2,4-Trichlorobenzene	96	10,000	140	--	0.07	--	0.07	5	0.3	570	5,500
Naphthalene	54	10,000	0.8	--	0.02	--	--	84	4	240	240
4-Chloroaniline	310	8,200	--	--	--	--	--	0.7	0.03	260	2,700
Hexachlorobutadiene	8.2	73	--	--	--	--	--	2	0.1	5.7	24
4-Chloro-3-methylphenol	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	123	10,000	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	--	--	--	--	--	--	0.05	400	20	450	4,600
2,4,6-Trichlorophenol	58	520	--	--	--	--	--	0.2	0.008	40	170
2,4,5-Trichlorophenol	330	10,000	--	--	--	--	--	270	14	6,500	68,000
Beta-Chloronaphthalene	--	--	--	--	--	--	--	--	--	110	110
2-Nitroaniline	--	--	--	--	--	--	--	--	--	3.9	41
3-Nitroaniline	--	--	--	--	--	--	--	--	--	--	--
Dimethylphthalate	1,900	10,000	--	--	--	--	--	--	--	100,000	100,000
Acenaphthylene	23	10,000	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	--	--	--	--	--	--	--	0.0007	3.00E-05	65	680
Acenaphthene	43	10,000	--	--	--	--	--	570	29	110	110

(a) RIDEM Remediation Regulations, as amended August 1996

SSL = Soil Screening Level DAF = Dilution Attenuation Factor

(c) EPA Region IX, May 1998

-- = no criterion provided

Tabl 2-3 (continued)
Semi-Volatile Organic Compounds (SVOC) Screening Criteria
NCBC Davisville, Rhode Island

COMPOUND	RIDEM Criteria (a)						EPA SDWA MCL (mg/L)	EPA Soil Screening Guidance Document (b) (mg/kg)		EPA Region IX Screening Criteria Preliminary Remedial Goals (RBC)	
	Direct Exposure (mg/kg)		Leachability		Ground-Water Objectives			Generic SSL for Transfers from Soil to Ground Water (DAF20)	Generic SSL for Transfers from Soil to Ground Water (DAF1)	Residential Soil (mg/kg)	Industrial Soil (mg/kg)
	Residential	Industrial/ Commercial	Class GA (mg/kg)	Class GB (mg/kg)	Class GA (mg/L)	Class GA (mg/L)					
2,4-Dinitrophenol	160	4,100	--	--	--	--	--	0.3	0.01	130	1,400
4-Nitrophenol	--	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	--	--	--	--	--	--	--	--	--	140	140
2,4-Dinitrotoluene	0.9	8.4	41	--	--	--	--	0.0008	4.00E-05	130	1,400
Diethylphthalate	340	10,000	41	--	--	--	--	470	23	52,000	100,000
4-Chlorophenyl-phenylether	--	--	41	--	--	--	--	--	--	--	--
Fluorene	28	10,000	--	--	--	--	--	560	28	90	90
4-Nitroaniline	--	--	--	--	--	--	--	--	--	--	--
2-methyl-4,6-Dinitrophenol	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	--	--	--	--	--	--	--	1	0.06	91	390
4-Bromophenyl-phenylether	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	0.4	3.6	--	--	0.001	--	0.001	2	0.1	0.28	1.2
Pentachlorophenol	5.3	48	--	--	0.001	--	0.001	0.03	0.001	2.5	7.9
Phenanthrene	40	10,000	--	--	--	--	--	--	--	--	--
Anthracene	35	10,000	--	--	--	--	--	12,000	590	5.7	5.7
Di-n-butyl phthalate	--	--	--	--	--	--	--	2,300	270	6,500	68,000
Fluoranthene	20	10,000	--	--	--	--	--	4,300	210	2,600	27,000
Carbazole	--	--	--	--	--	--	--	0.6	0.03	22	95
Pyrene	13	10,000	140	--	--	--	--	4,200	210	100	100
Butyl benzyl phthalate	--	--	0.8	--	--	--	--	930	810	930	930
1,1-Biphenyl	0.8	10,000	--	--	--	--	--	--	--	350	350
bis(2-Chloroisopropyl)ether	9.1	82	--	--	--	--	--	--	--	2.5	6.7
Diethylhexyl phthalate	--	--	--	--	0.006	--	0.006	--	--	--	--
3,3'-Dichlorobenzidine	1.4	13	--	--	--	--	--	0.007	0.0003	0.99	4.2
Chrysene	0.4	780	--	--	--	--	--	160	8	7.2	7.2
bis(2-Ethylhexyl)phthalate	46	410	--	--	--	--	0.006	3,600	180	32	140
Di-n-octylphthalate	--	--	--	--	--	--	--	10,000	10,000	1,300	10,000
Benzo(a)anthracene	0.9	7.8	--	--	--	--	--	2	0.08	0.61	2.6
Benzo(b)fluoranthene	0.9	7.8	--	--	--	--	--	5	0.2	0.61	2.6
Benzo(k)fluoranthene	0.9	78	--	--	--	--	--	49	2	6.1	26
Benzo(a)pyrene	0.4	0.8	--	--	0.0002	--	0.0002	8	0.4	0.061	0.26
Indeno(1,2,3-cd)pyrene	0.9	7.8	--	--	--	--	--	14	0.7	0.61	2.6
Dibenz(a,h)anthracene	0.4	0.8	--	--	--	--	--	2	0.08	0.061	0.26
Benzo(g,h,i)perylene	0.8	10,000	--	--	--	--	--	--	--	--	--

(a) RIDEM Remediation Regulations, as amended August 1996 (b) EPA, May 1996

SSL = Soil Screening Level DAF = Dilution Attenuation Factor

-- = no criterion provided

Table 2-4
Total Petroleum Hydrocarbons (TPH) Screening Criteria
NCBC Davisville, Rhode Island

COMPOUND	RIDEM Criteria (mg/kg) (a)				EPA SDWA MCL (mg/L)	EPA Region IX Screening Criteria (mg/kg)			
	Direct Exposure		Leachability			Soil Ingestion		SSL for Transfers from	SSL for Transfers from
	Residential	Industrial/ Commercial	Class GA	Class GB		Residential	Industrial	Soil to Ground Water (DAF 20)	Soil to Ground Water (DAF 1)
TPH **	500 *	2,500	500 *	2,500	--	--	--	--	--

(a) RIDEM Remediation Regulations, as amended August 1996

SSL = Soil Screening Level DAF = Dilution Attenuation Factor -- = no criterion provided

* - The criterion may be 1,000 mg/kg contingent upon field-verification by RIDEM personnel to determine compliance with Rule 8.01 (Remedial Objectives) prior to approval as a final remedial objective. These objectives include specific acceptable risk levels, consideration of nearby sensitive habitat, and protection of ground water.

** - The RIDEM Soil Criteria is given for TPH and does not differentiate between diesel, hydraulic fluid, and gasoline.

**Table 2-5
Inorganic Screening Criteria
NCBC Davisville, Rhode Island**

COMPOUND	RIDEM Criteria (a)						EPA SDWA MCL (mg/L)	EPA Soil Screening Guidance Document (b) (mg/kg)		EPA Region IX Screening Criteria (c)		NCBC Davisville Background Levels for Surface Soil (d) (mg/kg)
	Direct Exposure (mg/kg)		Leachability (TCLP/SPLP)		Ground-Water Objectives			Generic SSL for Transfers from Soil to Ground Water (DAF20)	Generic SSL for Transfers from Soil to Ground Water (DAF1)	Preliminary Remedial Goals (RBC)		
	Residential	Industrial/ Commercial	Class GA (mg/L)	Class GB (mg/L)	Class GA (mg/L)	Class GB (mg/L)				Residential Soil (mg/kg)	Industrial Soil (mg/kg)	
Aluminum	--	--	--	--	--	--	--	--	--	77000	100000	1,170 - 8,560
Antimony	10	820	0.05	--	0.006	--	0.006	5	0.3	31 *	680 *	ND
Arsenic	1.7	3.8	--	--	--	--	0.05	29	1	22 / 0.38 (f)	--/ 2.4 (f)	0.59 - 8.1
Barium	5,500	10,000	23	--	2	--	2	1,600	82	5,300 *	100,000 *	5.6 - 15.5
Beryllium	0.4	1.3	0.03	--	0.004	--	0.004	63	3	0.143	1.109	ND - 0.66
Cadmium	39	1,000	0.03	--	0.005	--	0.005	8	0.4	38 *	850 *	ND - 0.46
Calcium	--	--	--	--	--	--	--	--	--	--	--	62.7 - 628
Chromium III	1,400	10,000	--	--	--	--	--	--	--	--	--	no data
Chromium VI	390	10,000	--	--	--	--	--	38	2	30	64	no data
Chromium (total)	--	--	1.1	--	0.1	--	0.1	38	2	30	64	ND - 9.6
Cobalt	--	--	--	--	--	--	--	--	--	4,600	97,000	ND - 4.6
Copper	3,100	10,000	--	--	--	--	1.3 action	--	--	2,800 *	63,000 *	3.9 - 15
Cyanide	200	10,000	2.4	--	0.2	--	0.2	40	2	(e)	(e)	no data
Iron	--	--	--	--	--	--	--	--	--	--	--	3,810 - 12,000
Lead	150	500	0.04	--	0.015	--	0.015 action	--	--	400	1,000	3.4 - 53.8
Magnesium	--	--	--	--	--	--	--	--	--	--	--	325 - 1,220
Manganese	390	10,000	--	--	--	--	--	--	--	3,000 *	43,000 *	21.8 - 150
Mercury	23	610	0.02	--	0.002	--	0.002	--	--	(g)	(g)	ND - 0.03
Nickel	1,000	10,000	1	--	0.1	--	--	130	7	--	--	ND - 5
Potassium	--	--	--	--	--	--	--	--	--	--	--	145 - 728
Selenium	390	10,000	0.6	--	0.05	--	0.05	5	0.3	380	8,500	ND - 0.77
Silver	200	10,000	--	--	--	--	--	34	2	380 *	8,500 *	ND - 0.08
Sodium	--	--	--	--	--	--	--	--	--	--	--	ND -119
Thallium	5.5	140	0.005	--	0.002	--	0.002	0.7	0.04	(h)	(h)	ND
Vanadium	550	10,000	--	--	--	--	--	6,000	300	540	12,000	3.3 - 24.6
Zinc	6,000	10,000	--	--	--	--	--	12,000	620	23,000	100,000	10.3 - 172

(a) RIDEM Remediation Regulations, as amended August 1996 (b) EPA, May 1996 (c) EPA Region IX, May 1998 (d) TRC, 1994

(e) no criterion provided for elemental cyanide, criteria are available for free cyanide and cyanide compounds

(f) non-cancer/cancer criteria

(g) criterion available for methyl mercury only

(h) no criterion provided for elemental thallium, criteria are available for thallium compounds

SSL = Soil Screening Level DAF = Dilution Attenuation Factor

* - and compounds

TCLP = Toxicity Characteristic Leaching Procedure

ND = non-detect

Table 2-6
Pesticide/PCB Screening Criteria
Target Compound List - Pesticides/PCBs
NCBC Davisville, RI

COMPOUND	RIDEM Criteria (a)				EPA SDWA MCL (mg/l)	EPA Soil Screening Guidance Document (b)		EPA Region IX Screening Criteria (c)	
	Direct Exposure (mg/kg)		Leachability			Migration to Ground Water Generic SSL (DAF1) (mg/kg)	Migration to Ground Water Generic SSL (DAF20) (mg/kg)	RBC Residential Soil (mg/kg)	RBC Industrial Soil (mg/kg)
	Residential	Industrial/ Commercial	Class GA (mg/kg)	Class GB (mg/kg)					
alpha-BHC **	--	--	--	--	--	0.00003	0.0004	0.086	0.67
beta-BHC **	--	--	--	--	--	0.003	0.0001	0.3	2.3
gamma-BHC **	--	--	--	--	--	0.005	0.009	0.42	3.2
delta-BHC **	--	--	--	--	--	0.0001	0.003	0.03	2.3
Heptachlor	--	--	--	--	0.0004	1	23	0.099	0.67
Aldrin	--	--	--	--	--	590	12,000	0.026	0.18
Heptachlor epoxide	--	--	--	--	0.0002	0.03	0.7	0.049	0.33
Endosulfan	--	--	--	--	--	0.9	18	330	6,400
Dieldrin	0.04	0.4	--	--	--	0.0002	0.004	0.028	0.19
4,4'-DDE	--	--	--	--	--	3	54	1.7	13
Endrin	--	--	--	--	0.002	0.05	1	16	3,200
4,4'-DDD	--	--	--	--	--	0.8	16	2.4	19
Endosulfan sulfate	--	--	--	--	--	--	--	--	--
4,4'-DDT	--	--	--	--	--	2	32	1.7	13
Methoxychlor	--	--	--	--	0.04	8	160	270	5,300
Endrin ketone	--	--	--	--	--	--	--	--	--
Endrin aldehyde	--	--	--	--	--	--	--	--	--
alpha-Chlordane ***	0.5	4.4	1.4	--	0.0002	0.5	10	1.6	120
gamma-Chlordane ***	0.5	4.4	1.4	--	0.0002	0.5	10	1.6	120
Toxaphene	--	--	--	--	0.0003	2	31	0.4	2.7
Aroclor-1016	--	--	--	--	--	--	--	3.4	63
Aroclor-1221	--	--	--	--	--	--	--	--	--
Aroclor-1232	--	--	--	--	--	--	--	--	--
Aroclor-1242	--	--	--	--	--	--	--	--	--
Aroclor-1248	--	--	--	--	--	--	--	--	--
Aroclor-1254	--	--	--	--	--	--	--	0.97	18
Aroclor-1260	--	--	--	--	--	--	--	--	--
PCBs ****	10	10	10	10	0.0005	1,000	--	0.2	1.3

* - Draft Soil Screening Criteria ** - a.k.a. hexachlorocyclohexane (HCH) *** - RIDEM Criteria for Chlordane **** - Total of detected Aroclors
(a) RIDEM as amended August 1996 (b) EPA May 1996 (c) EPA Region IX, May 1998

TABLE 4-1
SVOC DETECTED IN SOIL SAMPLES DURING THE PHASE II EBS INVESTIGATION

SAMPLE ID	28-SB-01A		28-SB-01A		28-SB-01B		28-SB-01B		28-SB-01C		28-SB-01C		28-SB-01D		28-SB-01D		28-SB-01D	
SAMPLE INTERVAL	0-2'		2-4'		0-2' [DL]		2-4'		0-2'		2-3.5' [DL]		0-2'		2-4'		2-4' [DUP]	
DATE COLLECTED	4/24/96		4/24/96		4/24/96		4/24/96		4/24/96		4/24/96		4/24/96		4/24/96		4/24/96	
ANALYTE	µg/kg	Q	µg/kg	Q	µg/kg	Q	µg/kg	Q	µg/kg	Q	µg/kg	Q	µg/kg	Q	µg/kg	Q	µg/kg	Q
Naphthalene	30	J	ND		ND		ND		ND		140	J	ND		ND		550	J
Acenaphthylene	54	J	ND		ND		ND		ND		75	J	ND		ND		ND	
Acenaphthene	420		4200	J	2400	J	51		ND		1400	J	800	J	9200	J	21000	J
Fluorene	53	J	160	J	510	J	ND		ND		38	J	140	J	180	J	110	J
Phenanthrene	30		550	J	900	J	14		64	J	300	J	280	J	1600	J	1600	J
Anthracene	15		150	J	4600	J	40		52	J	92	J	300	J	430	J	800	J
Fluoranthene	73		1600	J	2500	J	41		17	J	480	J	930	J	1900	J	2800	J
Pyrene	70		1300	J	1700	J	37		13	J	360	J	2200	J	1500	J	2300	J
Benzo(a)anthracene	57		1200	J	590	J	11		4.4		230	J	1100	J	1300	J	2700	J
Chrysene	73		1200	J	1500	J	28		15	J	300	J	1400	J	1300	J	2700	J
Benzo(b)fluoranthene	100		1200	J	680	J	17		78		330	J	1800	J	1800	J	3800	J
Benzo(k)fluoranthene	39		510	J	300	J	74		2.9		99	J	820	J	690	J	1500	J
Benzo(a)pyrene	67		1600	J	330	J	8.2		36	J	280	J	1400	J	2200	J	2700	J
Indeno(1,2,3-cd)pyrene	47		500	J	150	J	41		17	J	130	J	490	J	800	J	1600	J
Dibenz(a,h)anthracene	9.0		150	J	ND		ND		ND		32	J	88	J	210	J	420	J
Benzo(g,h,i)perylene	87		840	J	280	J	6.4		32	J	240	J	700	J	1400	J	2700	J

Shaded data blocks indicate concentrations above RIDEM Industrial/Commercial Direct Soil Exposure Criteria or DAF 20 criteria, as described in Section 2.12.3

ND = not detected Q = data validation qualifier J = estimated

TABLE 4-2
ANALYTES DETECTED IN SOIL AND GROUND-WATER SAMPLES DURING
THE PHASE II EBS FOLLOW-ON INVESTIGATION

SAMPLE ID SAMPLE INTERVAL	28-GW-01A ¹ (µg/L) 7/17/97		28-GW-01A (Duplicate) (µg/L) 7/17/97		28-SS-01 7/1/97		28-SB-01 0-2' 6/17/97		28-SB-01 8-10' 6/17/97	
ANALYTE	CONC	Q	CONC	Q	CONC	Q	CONC	Q	CONC	Q
TPH										
TPH by 418.1 (mg/kg)	NA		NA		119		368		ND	
TPH GRO (µg/kg)	NA		NA		NA		NA		NA	
VOC (µg/kg)										
Acetone	ND		ND		ND		ND		220	
Methylene Chloride	ND		ND		ND		ND		ND	
Toluene	ND		ND		ND		ND		ND	
SVOC (µg/kg)										
Naphthalene	ND		ND		ND		ND		ND	
2-Methylnaphthalene	ND		ND		ND		ND		ND	
Acenaphthene	ND		ND		ND		ND		ND	
Diethylphthalate	ND		ND		ND		ND		ND	
Fluorene	ND		ND		ND		ND		ND	
Phenanthrene	ND		ND		530	J	ND		ND	
Anthracene	ND		ND		ND		ND		ND	
Carbazole	ND		ND		45	J	ND		ND	
Dibenzofuran	ND		ND		ND		ND		ND	
Di-n-butyl phthalate	ND		ND		ND		ND		57	J
Fluoranthene	ND		ND		930	J	ND		ND	
Pyrene	ND		ND		760	J	ND		ND	
Benzo(a)anthracene	ND		ND		93	J	ND		ND	
Chrysene	ND		ND		370	J	ND		ND	
bis(2-Ethylhexyl)phthalate	39	J	53	J	ND		ND		ND	
Benzo(b)fluoranthene	ND		ND		420	J	ND		ND	
Benzo(k)fluoranthene	ND		ND		130	J	ND		ND	
Benzo(a)pyrene	ND		ND		93	J	ND		ND	
Indeno(1,2,3-cd)pyrene	ND		ND		71	J	ND		ND	
Dibenzo(a,h)anthracene	ND		ND		ND		ND		ND	
Benzo(g,h,i)perylene	ND		ND		39	J	ND		ND	

Shaded data blocks indicate concentrations above RIDEM Ind./Com. Direct Soil Exposure or in the absence of RIDEM Criteria concentrations were compared to EPA Region IX DAF 20 Criteria.

NA = not analyzed

ND = not detected

Q = data validation qualifier

J = estimated

¹ Temporary sampling location (geoprobe) adjacent to 28-SB-14.

SAMPLE ID	28-SB-02		28-SB-02		28-SB-03		28-SB-03		28-SB-04	
SAMPLE INTERVAL	0-2'		8-10'		0-2'		6-8'		0-2'	
DATE COLLECTED	6/18/97		6/18/97		6/18/97		6/18/97		6/18/97	
ANALYTE	CONC	Q	CONC	Q	CONC	Q	CONC	Q	CONC	Q
TPH										
TPH by 418.1 (mg/kg)	ND		ND		ND		ND		ND	
TPH GRO (µg/kg)	NA		ND		NA		ND		NA	
VOC (µg/kg)										
Acetone	ND		15000	J	1300	J	4400	J	3700	J
Methylene Chloride	ND		ND		ND		ND		ND	
Toluene	ND		ND		ND		ND		ND	
SVOC (µg/kg)										
Naphthalene	ND		ND		ND		ND		ND	
2-Methylnaphthalene	ND		ND		ND		ND		ND	
Acenaphthene	ND		ND		ND		ND		ND	
Diethylphthalate	ND		ND		ND		ND		ND	
Fluorene	ND		ND		ND		ND		ND	
Phenanthrene	ND		ND		ND		ND		ND	
Anthracene	ND		ND		ND		ND		ND	
Carbazole	ND		ND		ND		ND		ND	
Dibenzofuran	ND		ND		ND		ND		ND	
Di-n-butyl phthalate	ND		ND		ND		ND		ND	
Fluoranthene	ND		ND		ND		ND		50	J
Pyrene	ND		ND		ND		ND		44	J
Benzo(a)anthracene	ND		ND		ND		ND		ND	
Chrysene	ND		ND		ND		ND		36	J
bis(2-Ethylhexyl)phthalate	ND		ND		ND		ND		ND	
Benzo(b)fluoranthene	ND		ND		ND		ND		50	J
Benzo(k)fluoranthene	ND		ND		ND		ND		ND	
Benzo(a)pyrene	ND		ND		ND		ND		ND	
Indeno(1,2,3-cd)pyrene	ND		ND		ND		ND		ND	
Dibenzo(a,h)anthracene	ND		ND		ND		ND		ND	
Benzo(g,h,i)perylene	ND		ND		ND		ND		ND	

Shaded data blocks indicate concentrations above RIDEM Ind./Com. Direct Soil Exposure or in the absence of RIDEM Criteria concentrations were compared to EPA Region IX DAF 20 Criteria.

NA = not analyzed

ND = not detected

Q = data validation qualifier

J = estimated

SAMPLE ID	28-SB-04		28-SB-05		28-SB-05		28-SB-06		28-SB-06	
SAMPLE INTERVAL	2-4'		0-2'		6-8'		0-2'		8'-10'	
DATE COLLECTED	6/18/97		6/18/97		6/19/97		6/18/97		6/19/97	
ANALYTE	CONC	Q	CONC	Q	CONC	Q	CONC	Q	CONC	Q
TPH										
TPH by 418.1 (mg/kg)	ND		34		ND		552		118	
TPH GRO (µg/kg)	NA		NA		ND		NA		ND	
VOC (µg/kg)										
Acetone	150	J	3000	J	2000	J	33		75000	
Methylene Chloride	ND		ND		ND		ND		ND	
Toluene	ND		ND		ND		ND		ND	
SVOC (µg/kg)										
Naphthalene	ND		ND		ND		ND		ND	
2-Methylnaphthalene	ND		ND		ND		ND		ND	
Acenaphthene	ND		ND		ND		62	J	ND	
Diethylphthalate	ND		ND		ND		ND		ND	
Fluorene	ND		ND		ND		62	J	ND	
Phenanthrene	ND		ND		ND		500		ND	
Anthracene	ND		ND		ND		87	J	ND	
Carbazole	ND		ND		ND		66	J	ND	
Dibenzofuran	ND		ND		ND		ND		ND	
Di-n-butyl phthalate	120	J	56	J	ND		49	J	ND	
Fluoranthene	ND		ND		ND		580		ND	
Pyrene	ND		ND		ND		490		ND	
Benzo(a)anthracene	ND		ND		ND		350		ND	
Chrysene	ND		ND		ND		340	J	ND	
bis(2-Ethylhexyl)phthalate	ND		ND		110	J	ND		ND	
Benzo(b)fluoranthene	ND		ND		ND		530		ND	
Benzo(k)fluoranthene	ND		ND		ND		180	J	ND	
Benzo(a)pyrene	ND		ND		ND		350		ND	
Indeno(1,2,3-cd)pyrene	ND		ND		ND		260	J	ND	
Dibenzo(a,h)anthracene	ND		ND		ND		84	J	ND	
Benzo(g,h,i)perylene	ND		ND		ND		250	J	ND	

Shaded data blocks indicate concentrations above RIDEM Ind./Com. Direct Soil Exposure or in the absence of RIDEM Criteria concentrations were compared to EPA Region IX DAF 20 Criteria.

NA = not analyzed

ND = not detected

Q = data validation qualifier

J = estimated

SAMPLE ID	28-SB-07		28-SB-07		28-SB-07		28-SB-08	
SAMPLE INTERVAL	0-2'		0-2'		2-4'		0-2'	
DATE COLLECTED	6/18/97		Duplicate 6/18/97		6/18/97		6/18/97	
ANALYTE	CONC	Q	CONC	Q	CONC	Q	CONC	Q
TPH								
TPH by 418.1 (mg/kg)	708	J	176	J	ND		1640	J
TPH GRO (µg/kg)	NA		ND		ND		NA	
VOC (µg/kg)								
Acetone	890	J	880	J	150	J	27	J
Methylene Chloride	4	J	ND		ND		ND	
Toluene	ND		ND		ND		ND	
SVOC (µg/kg)								
Naphthalene	ND		ND		ND		ND	
2-Methylnaphthalene	ND		ND		ND		ND	
Acenaphthene	ND		ND		ND		ND	
Diethylphthalate	ND		ND		ND		ND	
Fluorene	ND		ND		ND		ND	
Phenanthrene	190	J	210	J	ND		ND	
Anthracene	39	J	ND		ND		ND	
Carbazole	ND		ND		ND		ND	
Dibenzofuran	ND		ND		ND		ND	
Di-n-butyl phthalate	37	J	55	J	ND		ND	
Fluoranthene	1200	J	450	J	ND		ND	
Pyrene	930	J	330	J	ND		ND	
Benzo(a)anthracene	330	J	200	J	ND		ND	
Chrysene	330	J	240	J	ND		ND	
bis(2-Ethylhexyl)phthalate	ND		ND		ND		ND	
Benzo(b)fluoranthene	370		330	J	ND		ND	
Benzo(k)fluoranthene	120	J	120	J	ND		ND	
Benzo(a)pyrene	200	J	230	J	ND		ND	
Indeno(1,2,3-cd)pyrene	120	J	170	J	ND		ND	
Dibenzo(a,h)anthracene	41	J	54	J	ND		ND	
Benzo(g,h,i)perylene	100	J	170	J	ND		ND	

Shaded data blocks indicate concentrations above RIDEM Ind./Com. Direct Soil Exposure or in the absence of RIDEM Criteria concentrations were compared to EPA Region IX DAF 20 Criteria.

NA = not analyzed

ND = not detected

Q = data validation qualifier

J = estimated

SAMPLE ID SAMPLE INTERVAL	28-SB-08 0-2' Duplicate		28-SB-08 2'-4'		28-SB-09 0-2'		28-SB-09 2'-4'		28-SB-10 0-2'	
DATE COLLECTED	6/18/97		6/18/97		6/18/97		6/18/97		6/18/97	
ANALYTE	CONC	Q	CONC	Q	CONC	Q	CONC	Q	CONC	Q
TPH										
TPH by 418.1 (mg/kg)	94.5		810	J	1750		99.6		ND	
TPH GRO (µg/kg)	NA		ND		NA		ND		NA	
VOC (µg/kg)										
Acetone	22		ND		63	J	190		ND	
Methylene Chloride	ND		ND		ND		ND		ND	
Toluene	ND		ND		ND		ND		ND	
SVOC (µg/kg)										
Naphthalene	ND		ND		ND		ND		ND	
2-Methylnaphthalene	ND		ND		ND		ND		ND	
Acenaphthene	ND		ND		ND		ND		ND	
Diethylphthalate	ND		ND		ND		ND		ND	
Fluorene	ND		ND		ND		ND		ND	
Phenanthrene	160	J	220	J	ND		ND		ND	
Anthracene	ND		53	J	ND		ND		ND	
Carbazole	ND		ND		ND		ND		ND	
Dibenzofuran	ND		ND		ND		ND		ND	
Di-n-butyl phthalate	ND		ND		40	J	ND		ND	
Fluoranthene	330	J	260	J	ND		ND		ND	
Pyrene	320	J	360	J	ND		ND		38	J
Benzo(a)anthracene	200	J	200	J	ND		ND		ND	
Chrysene	250	J	190	J	ND		ND		ND	
bis(2-Ethylhexyl)phthalate	37	J	83	J	ND		46	J	36	J
Benzo(b)fluoranthene	450		240	J	ND		ND		ND	
Benzo(k)fluoranthene	150	J	67	J	ND		ND		ND	
Benzo(a)pyrene	310	J	190	J	ND		ND		ND	
Indeno(1,2,3-cd)pyrene	250	J	140	J	ND		ND		ND	
Dibenzo(a,h)anthracene	94	J	58	J	ND		ND		ND	
Benzo(g,h,i)perylene	290	J	170	J	ND		ND		ND	

Shaded data blocks indicate concentrations above RIDEM Ind./Com. Direct Soil Exposure or in the absence of RIDEM Criteria concentrations were compared to EPA Region IX DAF 20 Criteria.

NA = not analyzed

ND = not detected

Q = data validation qualifier

J = estimated

SAMPLE ID	28-SB-10		28-SB-11		28-SB-11		28-SB-12		28-SB-12	
SAMPLE INTERVAL	4'-6'		0-2'		2'-4'		0-2'		6'-8'	
DATE COLLECTED	6/19/97		6/19/97		6/19/97		6/19/97		6/19/97	
ANALYTE	CONC	Q	CONC	Q	CONC	Q	CONC	Q	CONC	Q
TPH										
TPH by 418.1 (mg/kg)	ND		644		127		35		ND	
TPH GRO (µg/kg)	NA		NA		NA		NA		NA	
VOC (µg/kg)										
Acetone	ND		ND		ND		ND		880	J
Methylene Chloride	ND		ND		ND		ND		ND	
Toluene	ND		ND		ND		ND		ND	
SVOC (µg/kg)										
Naphthalene	ND		ND		ND		ND		2300	
2-Methylnaphthalene	ND		ND		ND		ND		420	
Acenaphthene	ND		ND		ND		ND		530	
Diethylphthalate	ND		ND		ND		ND		61	J
Fluorene	ND		ND		ND		ND		140	J
Phenanthrene	65	J	ND		49	J	ND		140	J
Anthracene	ND		ND		ND		ND		ND	
Carbazole	ND		ND		ND		ND		ND	
Dibenzofuran	ND		ND		ND		ND		160	J
Di-n-butyl phthalate	ND		ND		ND		ND		56	J
Fluoranthene	78	J	55	J	67	J	ND		78	J
Pyrene	110	J	68	J	75	J	ND		66	J
Benzo(a)anthracene	75	J	ND		43	J	ND		ND	
Chrysene	80	J	41	J	50	J	ND		69	J
bis(2-Ethylhexyl)phthalate	40	J	ND		ND		ND		66	J
Benzo(b)fluoranthene	110	J	56	J	51	J	55	J	110	J
Benzo(k)fluoranthene	43	J	ND		ND		ND		ND	
Benzo(a)pyrene	87	J	ND		36	J	40	J	83	J
Indeno(1,2,3-cd)pyrene	56	J	ND		ND		ND		70	J
Dibenzo(a,h)anthracene	ND		ND		ND		ND		ND	
Benzo(g,h,i)perylene	66	J	ND		ND		ND		110	J

Shaded data blocks indicate concentrations above RIDEM Ind./Com. Direct Soil Exposure or in the absence of RIDEM Criteria concentrations were compared to EPA Region IX DAF 20 Criteria.

NA = not analyzed

ND = not detected

Q = data validation qualifier

J = estimated

SAMPLE ID SAMPLE INTERVAL	28-SB-13 0-2'		28-SB-13 2'-4'		28-SB-14 0-2'		28-SB-14 0'-2' Duplicate 6/20/97		28-SB-14 42'-44'	
DATE COLLECTED	6/19/97		6/19/97		6/20/97		6/20/97		6/23/97	
ANALYTE	CONC	Q	CONC	Q	CONC	Q	CONC	Q	CONC	Q
TPH										
TPH by 418.1 (mg/kg)	ND		ND		32.3	J	ND		ND	
TPH GRO (µg/kg)	NA		NA		NA		NA		NA	
VOC (µg/kg)										
Acetone	ND		470	J	ND		ND		17	
Methylene Chloride	ND		ND		ND		ND		ND	
Toluene	ND		ND		ND		ND		ND	
SVOC (µg/kg)										
Naphthalene	ND		ND		ND		ND		ND	
2-Methylnaphthalene	ND		ND		ND		ND		ND	
Acenaphthene	ND		ND		ND		ND		ND	
Diethylphthalate	ND		ND		ND		ND		ND	
Fluorene	ND		ND		ND		ND		ND	
Phenanthrene	ND		ND		63	J	ND		ND	
Anthracene	ND		ND		ND		ND		ND	
Carbazole	ND		ND		ND		ND		ND	
Dibenzofuran	ND		ND		ND		ND		ND	
Di-n-butyl phthalate	ND		ND		ND		ND		ND	
Fluoranthene	ND		ND		150	J	51	J	ND	
Pyrene	ND		ND		190	J	50	J	ND	
Benzo(a)anthracene	ND		ND		100	J	ND		ND	
Chrysene	ND		ND		110	J	ND		ND	
bis(2-Ethylhexyl)phthalate	ND		ND		ND		ND		ND	
Benzo(b)fluoranthene	ND		ND		150	J	39	J	ND	
Benzo(k)fluoranthene	ND		ND		45	J	ND		ND	
Benzo(a)pyrene	ND		ND		110	J	ND		ND	
Indeno(1,2,3-cd)pyrene	ND		ND		70	J	ND		ND	
Dibenzo(a,h)anthracene	ND		ND		ND		ND		ND	
Benzo(g,h,i)perylene	ND		ND		73	J	ND		ND	

Shaded data blocks indicate concentrations above RIDEM Ind./Com. Direct Soil Exposure or in the absence of RIDEM Criteria concentrations were compared to EPA Region IX DAF 20 Criteria.

NA = not analyzed

ND = not detected

Q = data validation qualifier

J = estimated

SAMPLE ID	28-SB-15		28-SB-15		28-SB-16		28-SB-16	
SAMPLE INTERVAL	0-2'		30'-32'		0-2'		14'-16'	
DATE COLLECTED	6/23/97		6/24/97		6/24/97		6/24/97	
ANALYTE	CONC	Q	CONC	Q	CONC	Q	CONC	Q
TPH								
TPH by 418.1 (mg/kg)	54.9		31.4		27.7		44.4	
TPH GRO (µg/kg)	NA		NA		NA		NA	
VOC (µg/kg)								
Acetone	ND		ND		ND		14	
Methylene Chloride	ND		ND		ND		ND	
Toluene	6	J	ND		ND		ND	
SVOC (µg/kg)								
Naphthalene	ND		ND		ND		ND	
2-Methylnaphthalene	ND		ND		ND		ND	
Acenaphthene	ND		ND		ND		ND	
Diethylphthalate	ND		ND		ND		ND	
Fluorene	ND		ND		ND		ND	
Phenanthrene	ND		ND		ND		ND	
Anthracene	ND		ND		ND		ND	
Carbazole	ND		ND		ND		ND	
Dibenzofuran	ND		ND		ND		ND	
Di-n-butyl phthalate	43	J	47	J	44	J	53	J
Fluoranthene	82	J	ND		ND		ND	
Pyrene	86	J	ND		ND		ND	
Benzo(a)anthracene	59	J	ND		ND		ND	
Chrysene	66	J	ND		ND		ND	
bis(2-Ethylhexyl)phthalate	ND		ND		ND		ND	
Benzo(b)fluoranthene	100	J	ND		ND		ND	
Benzo(k)fluoranthene	ND		ND		ND		ND	
Benzo(a)pyrene	58	J	ND		ND		ND	
Indeno(1,2,3-cd)pyrene	50	J	ND		ND		ND	
Dibenzo(a,h)anthracene	ND		ND		ND		ND	
Benzo(g,h,i)perylene	48	J	ND		ND		ND	

Shaded data blocks indicate concentrations above RIDEM Ind./Com. Direct Soil Exposure or in the absence of RIDEM Criteria concentrations were compared to EPA Region IX DAF 20 Criteria.

NA = not analyzed

ND = not detected

Q = data validation qualifier

J = estimated

TABLE 4-3
ANALYTES DETECTED IN SOIL SAMPLES DURING THE PHASE II EBS
FOLLOW-ON ADDENDUM II INVESTIGATION

ANALYTE SAMPLE INTERVAL (ft bgs) DATE COLLECTED	28-SB-17 8-10 10/13/98	28-SB-18 10-12 10/13/98	28-SB-19 8-10 10/13/98	28-SB-20 8-10 10/13/98	28-SS-21 0-2 10/13/98
METALS (mg/kg)					
		Q		Q	
Aluminum (fume or dust)	3,480		8,780		9,010
Antimony	ND		0.66	J	ND
Arsenic	1.6	J	2.5		2.4
Barium	11.6	J	35.8	J	37.6
Beryllium	0.27	J	0.57	J	0.52
Cadmium	ND		ND		0.81
Calcium	505	J	1,050	J	934
Chromium	4.9		13.3		10.8
Cobalt	4.2	J	9.5	J	8.4
Copper	8.4		28.3		21.9
Iron	6,980		17,300		16,000
Lead	4.6		24.6		27.2
Magnesium	969	J	3,240		2,550
Manganese	121	J	228	J	198
Mercury	ND		ND		ND
Nickel	6.9	J	17.1		12.4
Potassium	401	J	1170		1,080
Silver	ND		ND		ND
Sodium	101	J	103	J	92.3
Vanadium (fume or dust)	6.1	J	14.9		15.3
Zinc	20.7		61.8		73.7
SVOC (µg/kg)					
1,2-Benzphenanthracene	ND		ND		ND
Benzo(a)anthracene	ND		ND		ND
Benzo(a)pyrene	ND		ND		ND
Benzo(b)fluoranthene	ND		ND		ND
Fluoranthene	ND		ND		ND
Phenanthrene	ND		ND		ND
Pyrene	ND		ND		ND
VOC (µg/kg)					
Acetone	ND		20		ND
TPH (mg/kg)					
TPH	ND		ND		82.9

Shaded data blocks indicate concentrations above RIDEM Ind./Com. Direct Soil Exposure or in the absence of RIDEM Criteria concentrations were compared to EPA Region IX DAF 20 Criteria.

ND = not detected Q = data validation J = estimated

TABLE 4-4
ANALYTES DETECTED IN GROUND-WATER AND SEEP SAMPLES DURING THE
PHASE II EBS FOLLOW-ON ADDENDUM II INVESTIGATION

SAMPLE ID	28-GW-01	28-GW-01	28-GW-02	28-GW-02	28-GW-03	28-GW-03	28-GW-04	28-GW-04	28-GW-05
SAMPLE INTERVAL (ft bgs)	10-12	23-25	31-33	8-10	40-42	7-9	42-44	7-9	44-46
DATE COLLECTED	10/15/98	10/15/98	10/14/98	10/14/98	10/12/98	10/8/98	10/8/98	10/8/98	10/7/98
DISSOLVED METALS (µg/L)									
		Q	Q		Q	Q	Q	Q	
Aluminum (Fume or Dust)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Antimony	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	ND	1.8 J	ND	ND	ND	2.2 J	ND	24.5	ND
Barium	18.7 J	ND	ND	16.3 J	ND	55.4 J	77.1 J	15 J	18.9 J
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	60,600	ND	ND	ND	ND	ND	56,400	12,400	8,810
Cobalt	ND	ND	ND	ND	9.1 J	ND	ND	ND	ND
Iron	ND	ND	ND	ND	ND	ND	4,630 J	8,630 J	6,050 J
Lead	ND	ND	ND	ND	ND	ND	ND	ND	ND
Magnesium	6,310	6,060	4,060	ND	4,140	6,280	5,240 J	3,350 J	3,010 J
Manganese	ND	ND	ND	ND	695	ND	832	487	363
Nickel	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium	ND	ND	ND	ND	ND	ND	7,370	2,420 J	3,070 J
Sodium	ND	ND	ND	ND	ND	ND	21,200	26,300	55,000
Vanadium (Fume or Dust)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	ND	ND	ND	ND	ND	ND	7.6 J	73.4	124

Shaded data blocks indicate concentrations above RIDEM GB Ground-Water Objectives or in the absence of RIDEM Criteria concentrations were compared to Federal MCL.

ND= not detected

Q = data validation qualifier

J = estimated

SAMPLE ID	28-GW-05	28-GW-06	28-GW-06	28-GW-07	28-GW-07	28-GW-08	28-GW-08	28-SP-01	
SAMPLE INTERVAL (ft bgs)	8-10	35-37	7-9	27-29	6-8	29-31	8-10		
DATE COLLECTED	10/7/98	10/6/98	10/6/98	10/13/98	10/13/98	10/16/98	10/16/98	10/15/98	
DISSOLVED METALS (µg/L)									
							Q		Q
Aluminum (Fume or Dust)	ND	ND	128	ND	ND	ND		ND	2,630
Antimony	ND	ND	4.2 J	ND	ND	ND		ND	ND
Arsenic	ND	ND	ND	ND	ND	ND		ND	1.9 J
Barium	ND	19.8 J	447	ND	264	ND		372	370
Beryllium	ND	ND	ND	ND	ND	ND		ND	0.21 J
Calcium	ND	2,840 J	55,000	ND	ND	ND		72,200	ND
Cobalt	ND	ND	ND	ND	ND	ND		ND	ND
Iron	30,800 J	5,490 J	16,600 J	ND	ND	ND		ND	ND
Lead	ND	1 J	ND	ND	ND	ND		ND	29.3
Magnesium	ND	879 J	5,190 J	6,480	4,390	6,750		7,360	8,900
Manganese	ND	423	1,170	ND	704	1,600		ND	ND
Nickel	ND	ND	ND	11.8 J	ND	10.2 J	J	ND	ND
Potassium	4,360 J	2,170 J	4,850 J	ND	ND	ND		ND	ND
Sodium	6,250	48,900	10,100	ND	ND	50,800		ND	51,900
Vanadium (Fume or Dust)	ND	ND	ND	ND	ND	ND		ND	8.1 J
Zinc	ND	119	ND	ND	ND	ND		ND	ND

Shaded data blocks indicate concentrations above RIDEM GB Ground-Water Objectives or in the absence of RIDEM Criteria concentrations were compared to Federal MCL. For the seep sample, (28-SP-01) the shaded data blocks indicate concentrations above marine chronic AWQC.

ND = not detected J = estimated

ANALYTE SAMPLE INTERVAL (ft bgs) DATE COLLECTED	28-GW-02 31-33 10/14/98	28-GW-07 27-29 10/13/98	28-GW-07 6-8 10/13/98	28-GW-08 8-10 10/16/98	28-SP-01 10/15/98
SVOC (µg/L)					
				Q	
2-Methylnaphthalene	ND	ND	31		ND
Acenaphthene	ND	2	230	D	17
Anthracene	ND	ND	5		ND
Bis(2-ethylhexyl)phthalate	3	ND	ND		ND
Carbazole	ND	ND	49		ND
Dibenzofuran	ND	1	130	D	8
Fluoranthene	ND	ND	14		4
Fluorene	ND	1	150	D	12
Naphthalene	ND	ND	41		3
Phenanthrene	ND	1	160	D	7
Pyrene	ND	ND	7		2

Shaded data blocks indicate concentrations above RIDEM GB Ground-Water Objectives or in the absence of RIDEM Criteria concentrations were compared to Federal MCL.

For the seep sample, (28-SP-01) the shaded data blocks indicate concentrations above marine chronic AWQC.

ND= not detected

D = sample analyzed with a secondary dilution factor,

ANALYTE SAMPLE INTERVAL DATE COLLECTED	28-GW-02 31-33 10/14/98	28-GW-02 8-10 10/14/98	28-GW-03 40-42 10/8/98	28-GW-03 7-9 10/8/98	28-GW-04 42-44 10/8/98	28-GW-04 7-9 10/8/98	28-GW-05 44-46 10/7/98	28-GW-05 8-10 10/7/98	28-GW-06 35-37 10/6/98	28-GW-06 7-9 10/6/98	28-GW-07 27-29 10/13/98	28-GW-07 6-8 10/13/98	28-GW-08 29-31 10/16/98	28-GW-08 8-10 10/16/98										
VOC (µg/L)																								
				Q		Q		Q		Q		Q		Q										
1,1-Dichloroethylene	ND	ND	0.3	J	ND		0.4	J	ND		1		ND	ND	ND		ND		ND		ND			
1,2-Dichloroethene, total	ND	ND	2	J	7	J	13	J	31	J	4		ND	ND	0.4	J	ND		ND		2		ND	
Acetone	ND	ND	ND		ND		ND		ND		ND		ND	ND	ND		5	J	ND		ND		ND	
Benzene	ND	ND	ND		0.3	J	ND		0.9	J	ND		ND	ND	0.2	J	ND		0.3	J	ND		3	
Dichloroethylene	ND	ND	ND		ND		ND		ND		1		ND	ND	ND		ND		ND		ND		ND	
Methylbenzene	ND	ND	ND		ND		ND		0.1	J	ND		ND	ND	ND		ND		ND		ND		ND	
Trichloroethylene	ND	0.8 J	160	J	4		570	J	1		210	J		ND	2	ND				ND		49	J	ND
Vinyl chloride	ND	ND	ND		2	J	ND		10	J	ND		3	ND	8	J	ND		ND		3	J	4	

Shaded data blocks indicate concentrations above RIDEM GB Ground-Water Objectives or in the absence of RIDEM Criteria concentrations were compared to Federal MCL.

ND= Not Detected

J = estimated

ANALYTE	28-GW-01	28-GW-02	28-GW-02	28-GW-04	28-GW-04	28-GW-05	28-GW-07	28-GW-07	28-GW-08	28-SP-01
SAMPLE INTERVAL (ft bgs)	23-25	31-33	8-10	42-44	7-9	8-10	27-29	6-8	8-10	
DATE COLLECTED	10/15/98	10/14/98	10/14/98	10/8/98	10/8/98	10/7/98	10/13/98	10/13/98	10/16/98	10/15/98
PESTICIDES/PCB (µg/L)										
		Q		Q		Q		Q		Q
4,4'-DDD	0.0037	J	ND		0.0049	J	ND		ND	ND
4,4'-DDT	ND		ND		0.0063		ND		ND	ND
Alpha-BHC	ND		ND		ND		0.0073		ND	ND
Dieldrin	ND		ND		ND		ND		ND	ND
Endrin	ND		ND		ND		ND		ND	ND
Endrin aldehyde	0.0062	J	ND		ND		ND		ND	ND
Gamma-BHC	ND		ND		ND		0.0049		ND	0.0019
Heptachlor epoxide	ND		0.0016	J	ND		0.0013	J	0.0025	J

Shaded data blocks indicate concentrations above RIDEM GB Ground-Water Objectives or in the absence of RIDEM Criteria concentrations were compared to Federal MCL.

For the seep sample, (28-SP-01) the shaded data blocks indicate concentrations above marine chronic AWQC.

ND = not detected

J = estimated

APPENDIX A

PHASE II EBS INVESTIGATION

- A-1 Review Item 28 (Former Creosote Dip Tank Area)
 Figure, Boring Logs, and Analytical Data Summary
 Table**
- A-2 Review Item 60 (Septic Tanks Building E-107)
 Geophysical Survey, Figures, and Analytical Data
 Summary Tables**
- A-3 UST Remedial Investigation Report, December 1994 UST
 Location 68, Area E (Review Item 85)
 Figures, Boring Logs, and Analytical Data Summary
 Tables**
- A-4 Review Item 85 (UST Southwest of Building E-107)
 Boring Logs and Analytical Data Summary Table**
- A-5 Review Item 86 (Floor Drains, Building E-107)**

Appendix A-1

Review Item 28 (Former Creosote Dip Tank Area) Figure, Boring Logs, and Analytical Data Summary Table

"HOT SPOT"
AREA OF CONCERN

CREOSOTE DIP TANK
AREA OF CONCERN

EBS-28-SB-02
EBS-28-SB-03
EBS-28-SB-04
EBS-28-SB-01

BUILDING
E-107

RAMP

ALLEN HARBOR

DOCK

Westcott Rd.

LEGEND

⊙ SOIL BORING

150 75 0 150
GRAPHIC SCALE IN FEET

NOTES: 1) SAMPLE LOCATION SURVEY PERFORMED BY EA ENGINEERING, MAY 1996
2) ORIGINAL MAP SOURCE: NCBC STATION MAP, 1992

EA EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY

DESIGNED BY
JFW

CHECKED BY
JMC

DRAWN BY
JFW

PROJECT MGR.
JMC

DATE
APRIL 1997

SCALE
AS SHOWN

NCBC, DAVISVILLE
ENVIRONMENTAL BASELINE
SURVEY (EBS)
FINAL PHASE II EBS REPORT
DAVISVILLE, RHODE ISLAND

REVIEW ITEM 28
CREOSOTE DIP TANKS
SAMPLE LOCATION MAP

PROJECT NO.
29600.60.2290

FIGURE
4-20

FILE: F:\2960060\2290\CADD\ITEM-28.DWG

**EA Engineering, Science,
and Technology, Inc.**

LOG OF SOIL BORING

Coordinates:

Surface Elevation:**Well Riser Elevation:**

Job. No. 29600.60

Client: **NORDIV, NAVFAC**
NCBC Davisville

Location: EBS 28
Creosote Dip Tank Area

Drilling Method: Mobile B-61 rig, pushing 3 in.

split spoon samples continuous.

Boring No.

RENAMED
EBG-28-SB-04
28-SB01A

Sampling Method: 3" OD split-barrel sampler

driven by 140-lb hammer falling 30"

Sheet 1 of 1

Drilling Water Level: Not encountered

Date: _____ Time: _____

Start 04/24/96	Drilling Times	Finish 04/24/96
--------------------------	--------------------------	---------------------------

Surface Conditions: Grass/sand

08:00 AM		08:25 AM
----------	--	----------

[illegible]

SOIL DESCRIPTION

0-4" Silty fine to medium sand, little coarse sand, rootlets, light brown, dry.

4-17" Silty fine sand, little subrounded to subangular gravel to 1", olive gray, dry.

Silty fine sand, trace coarse sand to pea sized gravel, piece of glass in top 1", dark brown, dry.

NOTES:

Sample interval
Sample interval submitted for analysis.
NR - No reading
NA - Not applicable

Logged by: Judi Shapiro

Drilling Contractor: M&R Environmental Drilling

Driller: Phil Thornsby

CELL SPECIFICATIONS:

5. **Ja.Screen/Riser. NA**

Screen Interval: NA

Sandpack: NA

Grout NA

Bottom of Hole: 4 ft

Riser Interval: NA

Bentonite: NA

Cover.	NA
--------	----

**EA Engineering, Science,
and Technology, Inc.**

LOG OF SOIL BORING

Coordinates:

Surface Elevation:

Well Riser Elevation:

Job. No.
29600.60

Client: **NORDIV, NAVFAC**
NCBC Davisville

Location: EBS 28
Crepsote Dip Tank Area

Drilling Method: Mobile B-61 rig, pushing 2 in.
split spoon samples continuous.

Boring No. **RENAMED**
EBS-28-SB-02
28-SB-01B

**Sampling Method: 2" OD split-barrel sampler
driven by 140-lb hammer falling 30"**

Sheet 1 of 1

Drilling Water Level: Not encountered
Date: Time:

Start 04/24/96 08:25 AM	Drilling Times	Finish 04/24/96 08:40 AM
--	---------------------------------	---

Surface Conditions: Sand

[illegible]

SOIL DESCRIPTION

0-3"	Fine to medium sand, little coarse sand, yellowish-orange, dry.
3-16"	Silty fine sand, little coarse sand to subangular gravel to 1 1/4", olive gray, dry.

As above, gravel to 1", dry.

NOTES:

Sample interval
Sample interval submitted for analysis.
NR - No reading
NA - Not applicable

Logged by:

Judi Shapiro

Drilling Contractor:

M&R Environmental Drilling

Driller:

Phil Thornsbury

CELL SPECIFICATIONS:

5. a. Screen/Riser. NA

Screen Interval:

NA

Sandpack: NA

NA

Grout: NA

NA

Bottom of Hole: 4 ft

Riser Interval:

NA

Bentonite: NA

NA

Cover:	NA
--------	----

NA

**EA Engineering, Science,
and Technology, Inc.**

LOG OF SOIL BORING

Coordinates:

Surface Elevation: .

Well Riser Elevation:

Job. No.
29600.60

Client: NORDIV, NAVFAC
NCBC Davisville

Location: EBS 28
Creosote Dip Tank Area

Drilling Method: Mobile B-61 rig, pushing 2 in.
split spoon samples continuous.

Boring No.

RENAMED
~~EBG-28-SB-03~~
28-SB-01C

**Sampling Method: 2" OD split-barrel sampler
driven by 140-lb hammer falling 30"**

Sheet 1 of 1

Drilling Water Level: Not encountered

Date: _____ Time: _____

Surface Conditions: Grass/sand

Start	04/24/96	08:45 AM
-------	----------	----------

Drilling Times

Finish
04/24/96
09:00 AM

[illegible]

NOTES:

Sample interval
Sample interval submitted for analysis.
NR - No reading
NA - Not applicable

Logged by:

Judi Shapiro

Drilling Contractor:

M&R Environmental Drilling

Driller:

Phil Thornsbury

WELL SPECIFICATIONS:

Uja Screen/Riser: NA

Screen Interval: NA

Sandpack: NA

Grout: NA

Bottom of Hole: 4 ft

Riser Interval: NA

Bentonite: NA

Cover: NA

TABLE 4-2A
BUILDING AND AREA RELATED EBS REVIEW ITEMS
SEMIVOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES
NCBC DAVISVILLE, RI
TARGET COMPOUND LIST SEMIVOLATILES BY CLP OLM 01.8 METHOD

SAMPLE ID	EBS 22-SS-15	EBS 22-SB-01	EBS 22-SB-01	EBS 22-SB-02	EBS 22-SB-02	EBS 28-SB-01	EBS 28-SB-01	EBS 28-SB-02	EBS 28-SB-02								
SAMPLE INTERVAL	0-1'	0-2' [RE]	2-4' [RE]	0-2' [RE]	2-4' [RE]	0-2'	2-4'	0-2' [DL]	2-4'								
LAB SAMPLE ID	9602187	9606122, RE	9606125, RE	9606123, RE	9606124, RE	9606118	9606114	9606119, DL	9606120								
SDG #	960260	960659	960659	960659	960659	960659	960659	960659	960659								
DATE COLLECTED	02/27/96	04/24/96	04/24/96	04/24/96	04/24/96	04/24/96	04/26/96	04/24/96	04/24/96								
DATE EXTRACTED	03/08/96	05/18/96	05/18/96	05/18/96	05/18/96	05/07/96	05/07/96	05/07/96	05/07/96								
DATE ANALYZED	03/20/96	05/21/96	05/22/96	05/21/96	05/21/96	05/21/96	05/21/96	5/21/96, 5/24/96	05/21/96								
SAMPLE MATRIX	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL								
DILUTION FACTOR	1.0	1.0	1.0	1.0	1.0	1.0	10	20, 50	1.0								
PERCENT SOLIDS	89.1	85.9	81.0	83.0	88.0	92.0	87.0	90.1	91.6								
COMPOUND	CRQL	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q
Phenol	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
bis(2-Chloroethyl)ether	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
2-Chlorophenol	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
1,3-Dichlorobenzene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
1,4-Dichlorobenzene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
1,2-Dichlorobenzene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
2-Methylphenol	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
2,2'-oxybis(1-Chloropropane)	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
3 or 4-Methylphenol	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
N-Nitroso-di-n-propylamine	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
Hexachloroethane	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
Nitrobenzene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
Isophorone	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
2-Nitrophenol	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
2,4-Dimethylphenol	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
bis(2-Chloroethoxy)methane	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
2,4-Dichl rophenol	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
1,2,4-Trichlorobenzene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
Naphthalene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	30	J	460	UJ	890	UJ
4-Chloroaniline	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
Hexachlorobutadiene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
4-Chloro-3-methylphenol	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
2-Methylnaphthalene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
Hexachlorocyclopentadiene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
2,4,6-Trichl rophenol	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
2,4,5-Trichlorophenol	800	900	U	930	UJ	990	UJ	960	UJ	910	UJ	-	-	-	-	-	-
2-Chloronaphthalene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
2-Nitroaniline	800	900	U	930	UJ	990	UJ	960	UJ	910	UJ	-	-	-	-	-	-
Dimethylphthalate	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
Acenaphthylene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	54	J	800	UJ	1600	UJ
2,6-Dinitrotoluene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-
3-Nitroaniline	800	900	U	930	UJ	990	UJ	960	UJ	910	UJ	-	-	-	-	-	-
Acenaphthene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	420	-	4200	J	2400	J

TABLE 4-2A
BUILDING AND AREA RELATED EBS REVIEW ITEMS
SEMIVOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES
NCBC DAVISVILLE, RI
TARGET COMPOUND LIST SEMIVOLATILES BY CLP OLM 01.8 METHOD

SAMPLE ID		EBS 22-SS-15		EBS 22-SB-01		EBS 22-SB-01		EBS 22-SB-02		EBS 22-SB-02		EBS 22-SB-01		EBS 22-SB-01		EBS 22-SB-02		EBS 22-SB-02	
SAMPLE INTERVAL		0-1'		0-2' [RE]		2-4' [RE]		0-2' [RE]		2-4' [RE]		0-2'		2-4'		0-2' [DL]		2-4'	
LAB SAMPLE ID		9602187		9606122, RE		9606125, RE		9606123, RE		9606124, RE		9606118		9606114		9606119, DL		9606120	
SDG #		960260		960659		960659		960659		960659		960659		960659		960659		960659	
DATE COLLECTED		02/27/96		04/24/96		04/24/96		04/24/96		04/24/96		04/24/96		04/26/96		04/24/96		04/24/96	
DATE EXTRACTED		03/08/96		05/18/96		05/18/96		05/18/96		05/18/96		05/07/96		05/07/96		05/07/96		05/07/96	
DATE ANALYZED		03/20/96		05/21/96		05/22/96		05/21/96		05/21/96		05/21/96		05/21/96		5/21/96, 5/24/96		05/21/96	
SAMPLE MATRIX		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
DILUTION FACTOR		1.0		1.0		1.0		1.0		1.0		1.0		10		20, 50		1.0	
PERCENT SOLIDS		89.1		85.9		81.0		83.0		88.0		92.0		87.0		90.1		91.6	
COMPOUND	CRQL	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q
2,4-Dinitrophenol	800	900	U	930	UJ	990	UJ	960	UJ	910	UJ	-	-	-	-	-	-	-	-
4-Nitrophenol	800	900	U	930	UJ	990	UJ	960	UJ	910	UJ	-	-	-	-	-	-	-	-
Dibenzofuran	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
Diethylphthalate	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
4-Chl rophenyl-phenylether	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
Fluorene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	5.3	J	160	J	510	J	7.6	U
4-Nitroaniline	800	900	U	930	UJ	990	UJ	960	UJ	910	UJ	-	-	-	-	-	-	-	-
2-methyl-4,6-Dinitrophenol	800	900	U	930	UJ	990	UJ	960	UJ	910	UJ	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
4-Bromophenyl-phenylether	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
Hexachl robenzene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
Pentachlorophenol	800	900	U	930	UJ	990	UJ	960	UJ	910	UJ	-	-	-	-	-	-	-	-
Phenanthrene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	30	-	550	J	900	J	14	-
Anthracene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	15	-	150	J	4600	J	40	-
Di-n-butyl phthalate	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
Fluoranthene	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	73	-	1600	J	2500	J	41	-
Carbazole	330	370	U	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
Pyrene	330	41	J	380	UJ	410	UJ	400	UJ	380	UJ	70	-	1300	J	1700	J	37	-
Benzyl butyl phthalate	330	370	UJ	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	330	370	UJ	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
Benzo(a)anthracene	330	370	UJ	380	UJ	410	UJ	400	UJ	380	UJ	57	-	1200	J	590	J	11	-
Chrysene	330	370	UJ	380	UJ	410	UJ	400	UJ	380	UJ	73	-	1200	J	1500	J	28	-
bis(2-Ethylhexyl)phthalate	330	2100	UJ	45	J	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
Di-n-octylphthalate	330	370	UJ	380	UJ	410	UJ	400	UJ	380	UJ	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	330	41	J	380	UJ	410	UJ	400	UJ	380	UJ	100	-	1200	J	680	J	17	-
Benzo(k)fluoranthene	330	370	UJ	380	UJ	410	UJ	400	UJ	380	UJ	39	-	510	J	300	J	7.4	-
Benzo(a)pyrene	330	370	UJ	380	UJ	410	UJ	400	UJ	380	UJ	67	-	1600	J	330	J	8.2	-
Indeno(1,2,3-cd)pyrene	330	370	UJ	380	UJ	410	UJ	400	UJ	380	UJ	47	-	500	J	150	J	4.1	-
Dibenz(a,h)anthracene	330	370	UJ	380	UJ	410	UJ	400	UJ	380	UJ	9.0	-	150	J	44	UJ	2.2	U
Benzo(g,h,i)perylene	330	370	UJ	380	UJ	410	UJ	400	UJ	380	UJ	87	-	840	J	280	J	6.4	-

TABLE 4-1A
BUILDING AND AREA RELATED EBS REVIEW ITEMS
SEMIVOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES
NCBC DAVISVILLE, RI
TARGET COMPOUND LIST SEMIVOLATILES BY CLP OLM 01.8 METHOD

SAMPLE ID		EBS 28-SB-03		EBS 28-SB-03		EBS 28-SB-04		EBS 28-SB-04		EBS 28-SB-04		EBS 30-SS-01		EBS 30-SS-02		EBS 30-SS-03		EBS 30-SS-03	
SAMPLE INTERVAL		0-2'		2-3.5' [DL]		0-2'		2-4'		2-4' [DUP]		0-1'		0-1'		0-1'		0-1', DUP	
LAB SAMPLE ID		9606113		9606121, DL		9606115		9606116		9606117, DL		9602327		9602328		9602343		9602349	
SDG #		960659		960659		960659		960659		960659		960270		960270		960274		960274	
DATE COLLECTED		04/26/96		04/24/96		04/26/96		04/26/96		04/26/96		02/28/96		02/28/96		02/29/96		02/29/96	
DATE EXTRACTED		05/07/96		05/07/96		05/07/96		05/07/96		05/07/96		03/11/96		03/11/96		03/11/96		03/11/96	
DATE ANALYZED		05/21/96		5/21/96, 5/23/96		05/21/96		05/21/96		5/21/96, 5/23/96		03/22/96		03/22/96		03/25/96		03/25/96	
SAMPLE MATRIX		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
DILUTION FACTOR		1.0		1.0, 10		20		20		20, 50		1.0		1.0		1.0		1.0	
PERCENT SOLIDS		94.5		84.0		91.8		81.0		81.0		90.8		90.0		93.3%		95.0%	
COMPOUND	CRQL	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q
Phenol	330	-		-		-		-		-		360	U	370	U	350	U	350	U
bis(2-Chloroethyl)ether	330	-		-		-		-		-		360	U	370	U	350	U	350	U
2-Chlorophenol	330	-		-		-		-		-		360	U	370	U	350	U	350	U
1,3-Dichlorobenzene	330	-		-		-		-		-		360	U	370	U	350	U	350	U
1,4-Dichlorobenzene	330	-		-		-		-		-		360	U	370	U	350	U	350	U
1,2-Dichlorobenzene	330	-		-		-		-		-		360	U	370	U	350	U	350	U
2-Methylphenol	330	-		-		-		-		-		360	U	370	U	350	U	350	U
2,2'-oxybis(1-Chloropropane)	330	-		-		-		-		-		360	U	370	U	350	U	350	U
3 or 4-Methylphenol	330	-		-		-		-		-		360	U	370	U	350	U	350	U
N-Nitroso-di-n-propylamine	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Hexachloroethane	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Nitrobenzene	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Isophorone	330	-		-		-		-		-		360	U	370	U	350	U	350	U
2-Nitrophenol	330	-		-		-		-		-		360	U	370	U	350	U	350	U
2,4-Dimethylphenol	330	-		-		-		-		-		360	U	370	U	350	U	350	U
bis(2-Chloroethoxy)methane	330	-		-		-		-		-		360	U	370	U	350	U	350	U
2,4-Dichlorophenol	330	-		-		-		-		-		360	U	370	U	350	U	350	U
1,2,4-Trichlorobenzene	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Naphthalene	330	42	U	140	J	870	UJ	990	UJ	550	J	360	U	370	U	350	U	350	U
4-Chloroaniline	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Hexachlorobutadiene	330	-		-		-		-		-		360	U	370	U	350	U	350	U
4-Chloro-3-methylphenol	330	-		-		-		-		-		360	U	370	U	350	U	350	U
2-Methylnaphthalene	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Hexachlorocyclopentadiene	330	-		-		-		-		-		360	U	370	U	350	U	350	U
2,4,6-Trichlorophenol	330	-		-		-		-		-		360	U	370	U	350	U	350	U
2,4,5-Trichlorophenol	800	-		-		-		-		-		880	U	890	U	860	U	840	U
2-Chloronaphthalene	330	-		-		-		-		-		360	U	370	U	350	U	350	U
2-Nitroaniline	800	-		-		-		-		-		880	U	890	U	860	U	840	U
Dimethylphthalate	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Acenaphthylene	330	74	U	75	J	1500	UJ	1700	UJ	1700	UJ	360	U	370	U	350	U	350	U
2,6-Dinitrotoluene	330	-		-		-		-		-		360	U	370	U	350	U	350	U
3-Nitroaniline	800	-		-		-		-		-		880	U	890	U	860	U	840	U
Acenaphthene	330	42	U	1400	J	800	J	9200	J	21000	J	360	U	370	U	350	U	350	U

TABLE 4-2A
BUILDING AND AREA RELATED EBS REVIEW ITEMS
SEMIVOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES
NCBC DAVISVILLE, RI
TARGET COMPOUND LIST SEMIVOLATILES BY CLP OLM 01.8 METHOD

SAMPLE ID		EBS 28-SB-03		EBS 28-SB-03		EBS 28-SB-04		EBS 28-SB-04		EBS 28-SB-04		EBS 30-SS-01		EBS 30-SS-02		EBS 30-SS-03		EBS 30-SS-03	
SAMPLE INTERVAL		0-2'		2-3.5' [DL]		0-2'		2-4'		2-4'		0-1'		0-1'		0-1'		0-1', DUP	
LAB SAMPLE ID		9606113		9606121, DL		9606115		9606116		9606117, DL		9602327		9602328		9602343		9602349	
SDG #		960659		960659		960659		960659		960659		960270		960270		960274		960274	
DATE COLLECTED		04/26/96		04/24/96		04/26/96		04/26/96		04/26/96		02/28/96		02/28/96		02/29/96		02/29/96	
DATE EXTRACTED		05/07/96		05/07/96		05/07/96		05/07/96		05/07/96		03/11/96		03/11/96		03/11/96		03/11/96	
DATE ANALYZED		05/21/96		5/21/96, 5/23/96		05/21/96		05/21/96		5/21/96, 5/23/96		03/22/96		03/22/96		03/25/96		03/25/96	
SAMPLE MATRIX		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
DILUTION FACTOR		1.0		1.0, 10		20		20		20, 50		1.0		1.0		1.0		1.0	
PERCENT SOLIDS		94.5		84.0		91.8		81.0		81.0		90.8		90.0		93.3%		95.0%	
COMPOUND	CRQL	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q
2,4-Dinitrophenol	800	-		-		-		-		-		880	U	890	U	860	U	840	U
4-Nitrophenol	800	-		-		-		-		-		880	U	890	U	860	U	840	U
Dibenzofuran	330	-		-		-		-		-		360	U	370	U	350	U	350	U
2,4-Dinitrotoluene	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Diethylphthalate	330	-		-		-		-		-		360	U	370	U	350	U	350	U
4-Chlorophenyl-phenylether	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Fluorene	330	7.4	U	38	J	140	J	180	J	110	J	360	U	370	U	350	U	350	U
4-Nitroaniline	800	-		-		-		-		-		880	U	890	U	860	U	840	U
2-methyl-4,6-Dinitrophenol	800	-		-		-		-		-		880	U	890	U	860	U	840	U
N-Nitrosodiphenylamine	330	-		-		-		-		-		360	U	370	U	350	U	350	U
4-Bromophenyl-phenylether	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Hexachlorobenzene	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Pentachlorophenol	800	-		-		-		-		-		880	U	890	U	860	U	840	U
Phenanthrene	330	6.4	J	300	J	280	J	1600	J	1600	J	110	J	370	U	350	U	350	U
Anthracene	330	5.2	J	92	J	300	J	430	J	800	J	360	U	370	U	350	U	350	U
Di-n-butyl phthalate	330	-		-		-		-		-		360	U	370	U	18	J	350	U
Fluoranthene	330	17	J	480	J	930	J	1900	J	2800	J	220	J	370	U	350	U	350	U
Carbaz le	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Pyrene	330	13	J	360	J	2200	J	1500	J	2300	J	160	J	370	U	350	U	350	U
Benzyl butyl phthalate	330	-		-		-		-		-		360	U	370	U	350	U	350	U
3,3'-Dichlorobenzidine	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Benzo(a)anthracene	330	4.4		230	J	1100	J	1300	J	2700	J	58	J	370	U	350	U	350	U
Chrysene	330	15	J	300	J	1400	J	1300	J	2700	J	99	J	370	U	350	U	350	U
bis(2-Ethylhexyl)phthalate	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Di-n-octylphthalate	330	-		-		-		-		-		360	U	370	U	350	U	350	U
Benzo(b)fluoranthene	330	7.8		330	J	1800	J	1800	J	3800	J	150	J	370	U	350	U	350	U
Benzo(k)fluoranthene	330	2.9		99	J	820	J	690	J	1500	J	48	J	370	U	350	U	350	U
Benzo(a)pyrene	330	3.6	J	280	J	1400	J	2200	J	2700	J	72	J	370	U	350	U	350	U
Indeno(1,2,3-cd)pyrene	330	1.7	J	130	J	490	J	800	J	1600	J	360	U	370	U	350	U	350	U
Dibenz(a,h)anthracene	330	2.1	U	32	J	88	J	210	J	420	J	360	U	370	U	350	U	350	U
Benzo(g,h,i)perylene	330	3.2	J	240	J	700	J	1400	J	2700	J	360	U	370	U	350	U	350	U

Appendix A-2

Review Item 60 (Septic Tanks Building E-107) Geophysical Survey, Figures, and Analytical Data Summary Tables

**GEOPHYSICAL INVESTIGATION
NCBC DAVISVILLE
DAVISVILLE, RHODE ISLAND**

Prepared for:

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Sharon Commerce Center
2 Commercial Street, Suite 106
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Prepared by:

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File 96022
April 1996



Hager GeoScience, Inc.

April 11, 1996
File 96022

Ms. Jane Connet
EA Engineering, Science, and Technology, Inc.
Sharon Commerce Center
2 Commercial Street, Suite 106
Sharon, MA 02067

Re: Geophysical Investigation
NCBC Davisville
Davisville, RI
EA Project No. 296.0060.2200

Dear Ms. Connet:

This letter report summarizes the results of a geophysical investigation conducted by Hager GeoScience, Inc. (HGI) for EA Engineering, Science, and Technology, Inc. (EA) at NCBC Davisville in Davisville, Rhode Island. The investigation, performed March 19 through 22, 1996, was part of the EBS Phase II Review Item Work Plan Implementation at the former Naval Base. The location of the site is shown on Figure 1. Surveys were performed at 15 sites on the facility, in the areas labeled Zones 1,2,3 and West Davisville on Figure 1. The objective of the investigation was to help locate possible abandoned septic tanks and associated piping.

PROCEDURE

Three complementary geophysical techniques were used to perform the geophysical investigation: ground penetrating radar (GPR), EM terrain conductivity, and magnetics. GPR was used as the primary technique to locate and determine the approximate size and burial depth of septic tanks. As GPR signal penetration is often limited by conductive soils and/or brackish groundwater, at appropriate sites GPR was combined with EM terrain conductivity and magnetics to better locate areas of reinforced concrete and buried metal, as well as to determine whether GPR anomalies were metallic. Terrain conductivity was also used to help locate potential conductive zones associated with water conditioners and other septic system by-products.

Survey grids were established at each site with the assistance of EA's Joe Friesen and Judi Shapiro; the grids were oriented parallel and perpendicular to existing buildings and other cultural features using fiberglass tape. Grid nodes were staked and/or marked on the ground with water-soluble spray paint for later reference by EA. GPR data were collected generally along traverses 2.5 feet apart in two perpendicular directions. However, both the locations and spacing of lines were adjusted in the field on the basis of accessibility and preliminary on-site interpretation. Figures 2 through 15 show the areas of survey.

METHOD OF INVESTIGATION

Ground Penetrating Radar (GPR)

A GSSI SIR System 2 digital radar instrument with a 400-megahertz (MHz) antenna was used for the investigation. GPR data were collected continuously along survey lines and displayed on a color monitor. GPR data were simultaneously recorded on a 500-Mbyte hard drive for later processing and interpretation. The horizontal scale on each GPR record is determined by the antenna speed. Survey stations are recorded on GPR records by pressing a marker button as the center line of the antenna passes each grid node (at 5-foot intervals for this survey). The vertical scale of these radar "cross-sections" is determined by the recording interval, which was 80 to 90 nanoseconds for this survey. The recording interval represents the maximum two-way travel time in which data are recorded. GPR travel times were converted to depths using GPR propagation velocities determined at similar sites.

The GPR method operates by transmitting low-powered microwave energy into the ground. In this instance, the energy has a center wave frequency of 400 MHz, depending on the soil properties. The GPR signal is reflected back to the antenna by materials with contrasting electrical (dielectric and conductivity) and physical properties. Metal objects such as USTs or utilities typically produce high-amplitude hyperbolic reflections on GPR records. Clay or concrete pipes and boulders produce similar radar signatures. Concrete septic tanks or slabs produce a flat, high-amplitude reflector on the radar records.

EM Terrain Conductivity

The terrain conductivity survey was conducted using a Geonics Model EM31-DL terrain conductivity meter. This induction-type instrument measures terrain conductivity without electrodes or direct soil contact. The meter is calibrated to read ground conductivity directly in millimhos per meter (mmhos/m), with a resolution of 1 mmho/m. The transmitting and receiving coils in the EM31-DL have a fixed separation of 3 meters. When used in its normal operating (vertical dipole) mode, the EM31 achieves a penetration depth of about 20 feet. Buried metal objects are typically indicated by negative or erratic and high conductivity values. The instrument response is more affected by near-surface than by deeper material.

Magnetics

The magnetics survey was performed using a Geometrics G-856 proton precession magnetometer. This instrument contains a microprocessor capable of storing data for approximately 1,000 stations, and it can collect data at each station in 10 to 20 seconds. The instrument has a sensitivity of 0.1 gamma.

The magnetic method measures the total magnetic field strength of the earth. It works on the principle that ferrous (iron or steel) objects cause localized perturbations in the earth's total magnetic field that are measurable with the magnetometer. The magnetic method detects buried steel and iron objects, such as underground storage tanks and drums, to a depth of approximately 25 feet.

SURVEY LIMITATIONS

Ground Penetrating Radar (GPR)

GPR signal penetration is site specific, determined by the dielectric properties of concrete and local soil and fill materials. GPR signals propagate well in resistive materials such as unsaturated sand and gravel. However, soils containing clay, ash- or cinder-laden fill, or fill saturated with brackish or otherwise conductive groundwater, cause GPR signal attenuation and loss of target resolution (i.e., limited detection of small objects). GPR signal penetration may also be limited in soils filled with metal scrap or construction debris, as the signal is scattered and redirected to the surface at the soil-metal (or soil-concrete) interface.

Interpreted depths shown on Figures 2 through 16 and stated in this report are based on estimated GPR signal propagation velocities from similar sites. Note that GPR velocities, and therefore estimated depths, may vary if the medium of investigation or soil water content is not uniform throughout the site. (Electromagnetic waves do not travel as fast through water as air, so the distance to a reflector below the water table may appear farther than in actuality.)

GPR is an interpretive method, based on the subjective identification of reflection patterns that may not uniquely identify a subsurface target. Obtaining data along multiple survey traverses helps to determine the size and shape of buried targets. Nevertheless, interpretation of GPR data is more subjective than that for most other geophysical methods, and we recommend confirming GPR results with other geophysical methods or through borings or test pits.

Changes in the speed at which the antenna is moved between stations causes slight variations in distance interpolations, and hence interpreted object positions. Although unlikely, these variations may exceed ± 1.0 foot for this survey. Such interpolation variations were minimized during this survey by using 5-foot distance marks.

The antenna produces a cone-shaped signal pattern that emanates approximately 10 to 15 degrees from horizontal fore and aft of the antenna. Therefore, buried objects may be detected before the antenna is located directly over them, and GPR anomalies may appear larger than actual target dimensions, especially if the target is located at depth.

EM Terrain Conductivity/Magnetics

Terrain conductivity and magnetic surveys are subject to cultural interference from overhead power lines and surface metal objects, such as cars, trucks, buildings, fences, etc., that may mask objects at depth. Buried utilities also produce elevated or negative conductivity values that may obscure other objects of interest.

The shape and amplitude of magnetic and EM anomalies do not uniquely describe a buried object or material, as these anomalies often appear larger than the buried object(s). Also, the shape and amplitude of anomalies are influenced by the orientation of survey lines and the buried object(s) relative to north, and by the orientation of the EM31 coils relative to the buried object(s).

Closely-spaced buried utilities may produce magnetic and terrain conductivity anomalies that interfere with one another (i.e. the anomalies overlap, producing a different signature). Hence, in areas where numerous utilities are present, the observed anomaly may result from an interference pattern and may not uniquely describe the location of a specific utility.

Smaller utilities, or utilities constructed from reinforced concrete, may be masked by larger utilities constructed of metal. Terrain conductivity or magnetics will not detect utilities constructed from PVC, clay, or unreinforced concrete.

RESULTS

The results of the geophysical investigation are shown on Figures 2 through 16. GPR surveys were performed at all 15 of the sites. The GPR signal penetrated approximately 8 to 12 feet below grade at sites where the water table was 7 to 8 feet deep. Magnetic and EM terrain conductivity data were collected at sites that were open and at least 25 feet from above-ground metal objects, such as buildings, overhead power lines, and dumpsters. The survey results are summarized by area below.

ZONE 1: EBS 40, 41A, 41B, 42, AND 72

Site EBS 40 (Figure 2)

Site EBS 40 is located approximately 150 feet southeast of Building 404, at former Building 49, adjacent to Kingston Street. GPR detected several flat, high-amplitude reflectors interpreted as caused by concrete. The majority of these reflectors is attributed to old foundations. Flat GPR reflectors detected approximately 1 foot below ground along Lines 0+07.5E and 0+10E, Stations 0+12.5N through 0+17.5N, and along Line 0+15N, Stations 0+07.5E through 0+12.5E, are attributed to a septic tank. EM conductivity and in-phase anomalies were observed at the same location as this flat GPR reflector. A weak magnetic anomaly was also observed at Station 0+14N, 0+10E.

Site EBS 41A (Figure 3)

Site EBS 41A is located about 50 feet north of Davisville Road, near former Building 118, and about 100 feet west of Building S-85. Two septic tanks were reportedly removed from this site. GPR detected several large reflectors approximately 7 feet below ground, as well as two smaller anomalies approximately 2 feet below ground. The anomalies detected along Lines 0+07.5E through 0+12.5E, Stations 0+12.5N through 0+16N, are attributed to remnants of a septic system, or possibly a large pipe. An EM conductivity anomaly is centered at Station 0+11N, 0+12.5E, nearly coincident with the GPR anomaly observed there. This anomaly is also apparent in the contoured EM in-phase data.

Site EBS 41B (Figure 4)

Site EBS 41B is located about 100 feet north of Site EBS 41A and 40 feet northwest of Building S-85. The site is bounded on the south by two large reinforced concrete slabs associated with a former building. Because of reinforced concrete and some demolition debris, GPR penetration was limited to about 5 feet. Three flat GPR reflectors, attributed to concrete, were detected along Lines 0+00N

and 0+02.5N, Stations 0+08E through 0+12.5E, and Line 0+12.5E, Stations 0+00N through 0+02.5N, approximately 4 feet below ground. These reflectors may be caused by a septic tank or a buried concrete slab from the former building. An EM conductivity, but no in-phase or magnetic anomaly, was observed near this possible septic tank. GPR also detected a utility parallel to Line 0+20N approximately 2 feet below ground.

Site EBS 42 (Figure 5)

Station 0+00N, 0+00E of Site EBS 42 is located 10 feet north and 15 feet east of the northwest corner of Building 43. Only the GPR method was used at Site EBS 42, since the site is bisected from east to west by a fence at 0+09N. Numerous utilities were also detected. GPR detected several large, flat reflectors probably caused by a concrete slab 8 inches to 1 foot below ground along Lines 0+10N through 0+17.5N, Stations 0+12.5E through 0+18E. This concrete slab may be associated with a septic tank.

Site EBS 72 (Figure 6)

Station 0+00N, 0+00E is located 35 feet east and 25 feet south of the northeast corner of Building 43. Concrete pavement at the site limited GPR signal penetration to 4 to 5 feet below ground. Two large, flat GPR reflectors were detected approximately 3 feet below ground along Lines 0+12.5E through 0+15E, Stations 0+11N through 0+15N. These reflectors may be caused by a septic tank. Reflectors interpreted as a utility were observed trending north-south at 0+15.5E, toward the possible septic tank. An EM conductivity anomaly is centered over this GPR anomaly. Large GPR reflectors of uncertain origin were detected at the eastern edge of the survey grid. EM conductivity and in-phase anomalies were observed at Station 0+02.5N, 0+05E; GPR and magnetic anomalies were not observed in this area.

ZONE 2: EBS 44, 49, AND 52

Site EBS 44 (Figure 7)

Station 0+20N, 0+15E of Site EBS 44 is located 20 feet north of Building 67. Several flat GPR reflectors possibly caused by concrete structures were observed in the survey area. One set of anomalies, centered at Station 0+32.5N, 0+10E, may be caused by a septic system 3 feet below ground. Other reflectors characteristic of concrete, located 2 feet below ground, were detected immediately north of an east-west trending utility at 0+28N.

Site EBS 49 (Figure 8)

Site EBS 49 is located immediately south of Warehouse W-1, a large corrugated metal building. Thus EM31 and magnetic surveys were not performed. A possible septic discharge pipe was observed at the building edge, at Station 0+20N, 0+22E. GPR detected a pipe at 0+22E trending south from the building as far as Station 0+10N. Large, flat GPR reflectors, interpreted as caused by a septic tank, were detected approximately 2 feet below ground along Lines 0+20E through 0+25E, Stations 0+10N through 0+13N. A utility was also detected approximately parallel to 0+05N.

Site EBS 52 (Figure 9)

Site EBS 52 is located 140 feet north of a hydrant, 170 feet north of Building 38, and about 300 feet south of Davisville Road. High-amplitude, flat GPR reflectors, interpreted as caused by a septic tank, were detected approximately 2.5 feet below ground along Lines 0+27.5E through 0+32.5E, Stations 1+52.5N through 1+57.5N, and along Lines 1+52.5N through 1+57.5N, Stations 0+27.5E through 0+32.5E. EM conductivity and in-phase anomalies were observed at the same location. Magnetic data indicate a possible buried metal object near 1+47.5N, 0+15E, a location that does not coincide with that of the interpreted septic tank. GPR also detected low-amplitude, flat reflectors of uncertain origin approximately 2 feet below ground near 1+52.5N, 0+20E.

ZONE 3: EBS 53, 56A (EBS 24), 56B, 60, AND 87/60

Site EBS 53 (Figure 10)

Site EBS 53 is located in a heavily wooded area, near the former location of Building 218. High-amplitude, flat GPR reflectors were observed at two locations in the survey area. Reflectors observed approximately 3 feet below ground along Lines 0+00E and 0+02.5E, Stations 0+01N through 0+04N, may be caused by a septic tank. A pipe was detected immediately north of this feature. Other high-amplitude reflectors, detected 2 feet below ground near 0+15N, 0+25E at the edge of the survey grid, may also be caused by a septic tank. A utility was also detected near this location, trending east-west at Line 0+12.5N. Magnetic data for Site EBS 53 were inconclusive.

Site EBS 56A(EBS 24) (Figure 11)

Site EBS 56A is located immediately north of Building S-41, of which the northeast corner corresponds to Station 0+05N, 0+00E. GPR was the only geophysical method used because of the proximity of the survey area to Buildings S-41 and 224. A concrete structure, interpreted as a septic tank, was detected by GPR approximately 4 feet below ground along Lines 0+12.5E through 0+15E, Stations 0+07.5N through 0+11N. The GPR record of this structure is shown in Figure 16. Numerous utilities were also detected. A pipe trending east-west roughly parallel to 0+13.5N appears to be related to the catch basin at Station 0+15N, 0+02.5E.

Site EBS 56B (EBS 56) (Figure 11)

Site EBS 56B is located immediately north of Building 224. A clean-out, possibly associated with a dry well, corresponds to grid coordinate 0+09N, 0+70E. A large reflector was detected approximately 4 feet below ground at Station 0+21N, 0+95E. The anomaly is localized, however, and we judge it unlikely to be caused by a septic tank. Other GPR reflectors indicative of a concrete structure or septic tank were not observed. However, an area of excavation possibly associated with a former buried structure was detected along Lines 0+10N through 0+15N, Stations 0+67.5E and 0+70E.

Site EBS 60 (Figure 12)

Site EBS 60 is located immediately east of building E-107, the southeast corner of which corresponds to Station 0+00N, 0+00E. GPR was the only geophysical method used because of the proximity of the corrugated metal building and a dumpster. The GPR signal penetrated only about 7 feet below ground because of the high water table and proximity of the site to the ocean. Large GPR reflectors possibly caused by a septic tank were observed approximately 6 feet below ground at Station 0+07.5N, 0+05E. Other localized GPR anomalies were observed along Lines 0+05N and 0+07.5N. Numerous utilities were also detected. ✓

Site EBS 77 (Figure 13)

Site EBS 77 is located immediately north of Flammable Storage Building 299, the northwest corner of which corresponds to Station 0+00N, 0+00E. The purpose of the survey was to trace a possible septic pipe trending north from the building. Only GPR was used because of the dense brush and limited space. Traverses were made perpendicular to the apparent trend of the pipe, which was detected approximately 2 feet below ground along Lines 0+02.5N through 0+22.5N, 0+02.5E. The pipe appears to jog slightly westward between Lines 0+22.5N and 0+70N, as it was detected at approximately 0+05W along Lines 0+70N and 0+80N. The pipe was not detected along Line 1+60N, immediately north of the catch basin. Dense brush prevented confirmatory GPR traverses from being made between Lines 0+80N and 1+60N.

Site EBS 87/60 (Figure 14)

Site EBS 87/60 located approximately 50 feet east of Building 365 and 30 feet east of the catch basin. Several high-amplitude, flat GPR reflectors were detected 2 feet below ground along Lines 0+22.5N through 0+30N, Stations 0+05E through 0+12.5E. These reflectors may be caused by a concrete structure, possibly a septic tank. EM conductivity and in-phase data show anomalies near this possible septic tank, but no magnetic anomalies were observed. A pipe was detected trending roughly parallel to 0+04E. No reflectors indicative of a septic tank were detected elsewhere in the survey area.

WEST DAVISVILLE

Site EBS 36 (Figure 15)

Station 0+10N, 0+12.5E of Site EBS 36 is located approximately 30 feet south of a corrugated metal shed. Because a wooden septic tank was reportedly present at this location, GPR was the only geophysical method used. GPR reflectors attributed to a septic tank were observed along Lines 0+07.5N through 0+12.5N, Stations 0+10E through 0+15E. We judge that the GPR anomaly, observed 5 feet below ground, is caused by the reflection of the GPR signal off a water-saturated wooden cover or its reverberation within the air space of the septic tank.

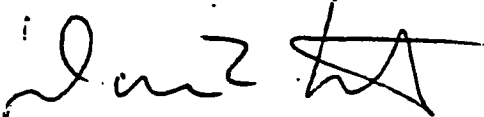
RECOMMENDATIONS

We recommend test pits to confirm geophysical results, especially in those areas where GPR was the only geophysical method used. All invasive work should proceed with caution, as the geophysical investigation may not have detected all the utilities present. We recommend excavating test pits at the following locations:

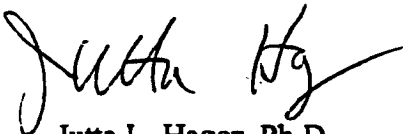
- | | | |
|----------------|-------------------|--|
| 1) EBS 40: | 0+15N, 0+10E: | Probable septic tank |
| 2) EBS 41A: | 0+13N, 0+10E: | Possible septic tank or remnant |
| 3) EBS 41B: | 0+01.5N, 0+11E: | Possible septic tank |
| 4) EBS 42: | 0+14N, 0+17.5E: | Near-surface concrete slab; possible septic tank |
| 5) EBS 72: | 0+12.5N, 0+12.5E: | Possible septic tank |
| 6) EBS 44: | 0+32.5N, 0+10E: | Possible concrete pad or tank |
| 7) EBS 49: | 0+12.5N, 0+22E: | Probable septic tank |
| 8) EBS 52: | 0+54N, 1+31E: | Possible septic tank |
| 9) EBS 53: | 0+2.5N, 0+02.5E: | Possible septic tank |
| | 0+15N, 0+25E: | Possible septic tank |
| 10) EBS 56A: | 0+10N, 0+13E: | Probable septic tank |
| 11) EBS 56B: | | Not observed; clean-out at 0+09N, 0+70E |
| 12) EBS 60: | 0+07.5N, 0+05E: | Possible septic tank |
| 13) EBS 77: | 0+02.5N - 0+80N: | Pipe at Stations 0+02.5E to 0+05W |
| 14) EBS 87/60: | | |
| | 0+25N, 0+10E: | Possible concrete or septic tank |
| 15) EBS 36: | 0+10N, 0+12.5E: | Probable septic tank |

Please call us at (617) 893-9700 if you have any questions regarding this report. We have appreciated the opportunity to work with EA and hope to do so again in the near future.

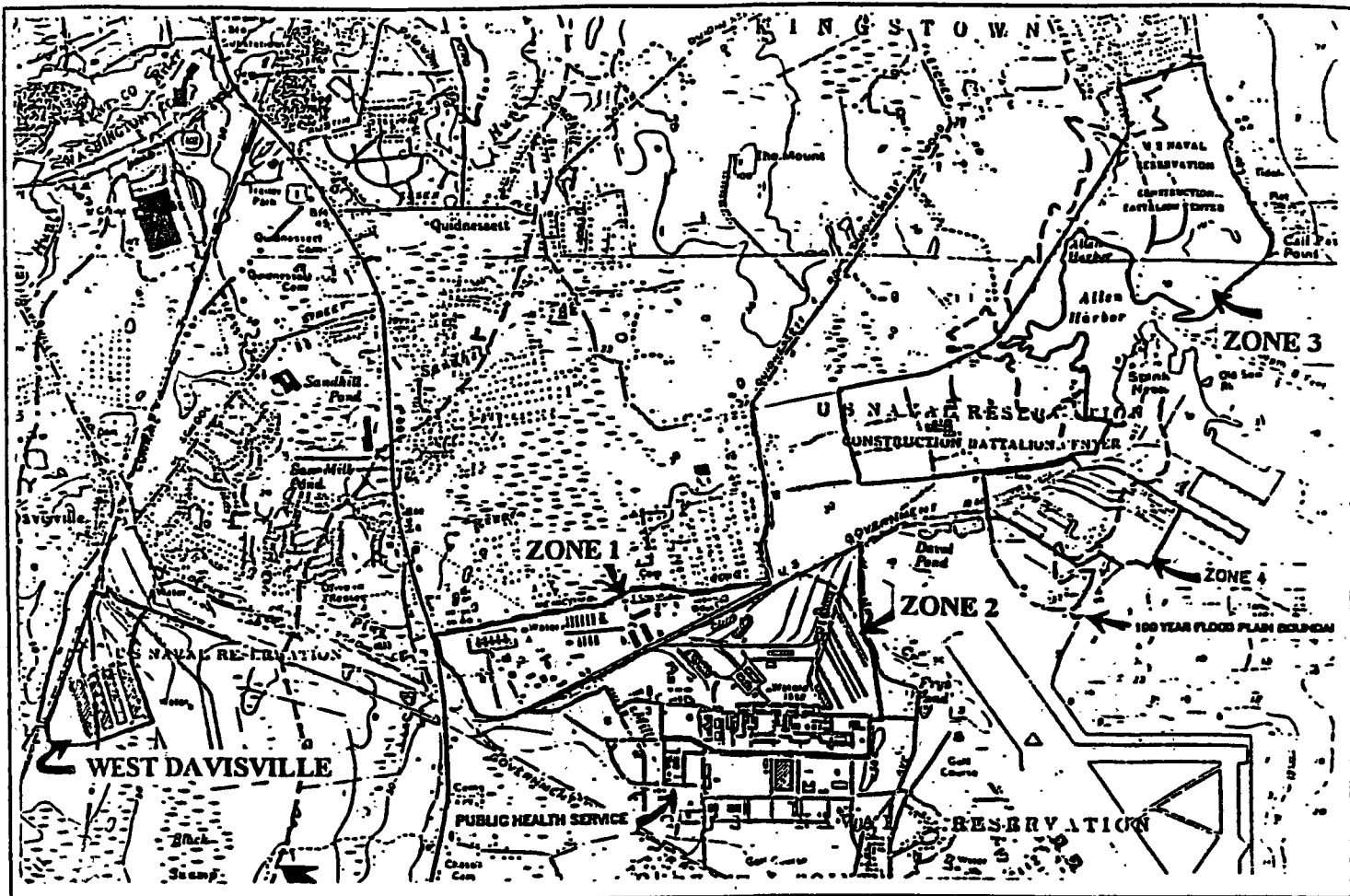
Respectfully yours,
HAGER GEOSCIENCE, INC.



Doria Kutrubes
Senior Geophysicist



Jutta L. Hager, Ph.D.
President



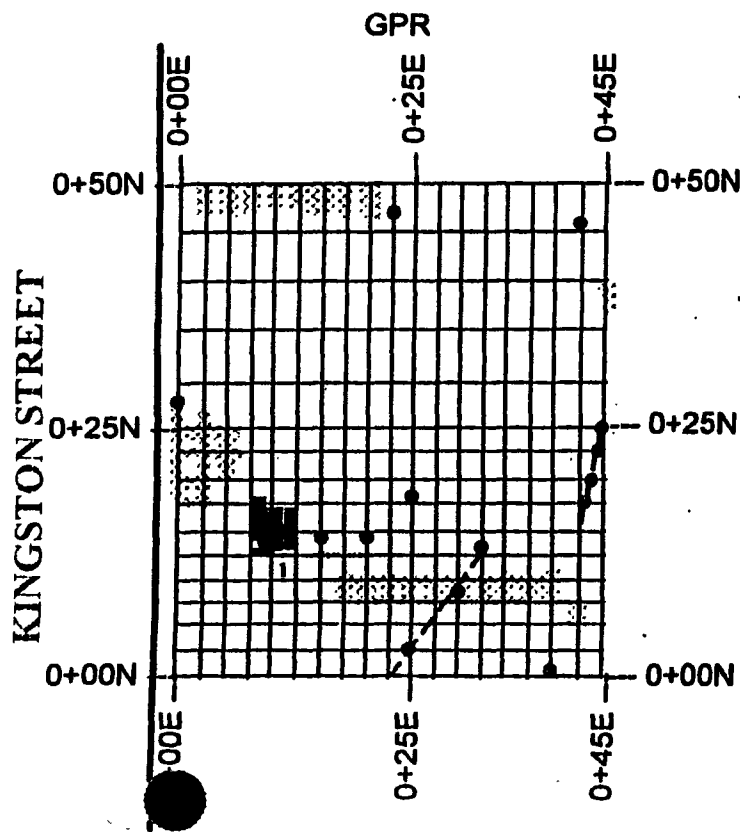
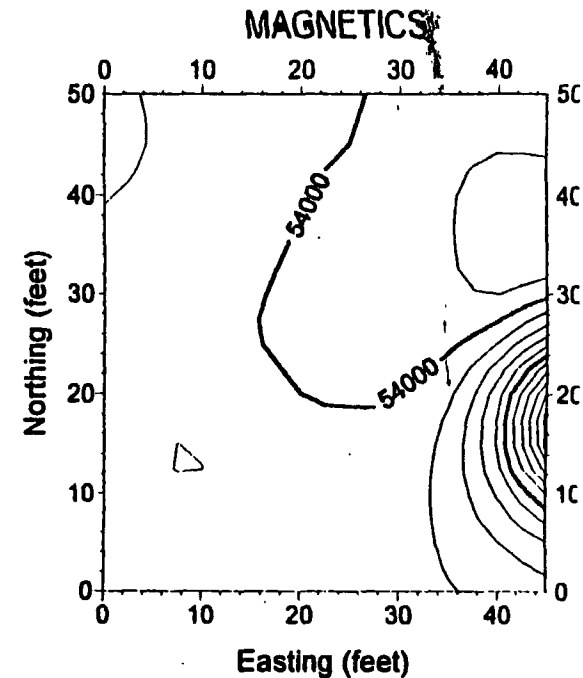
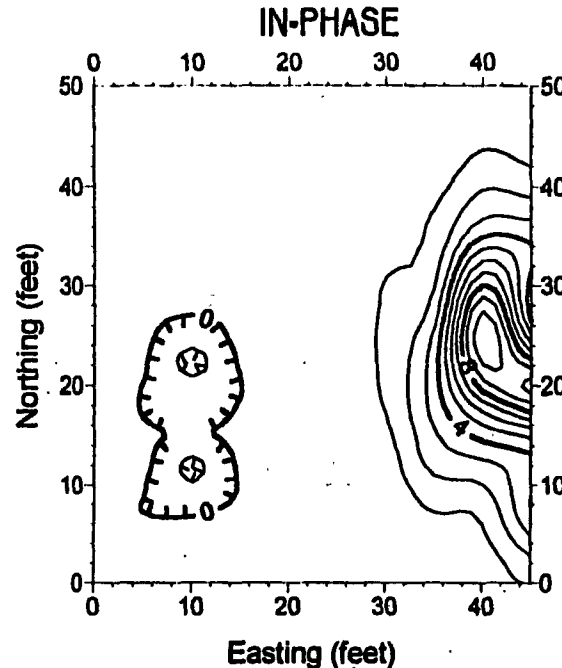
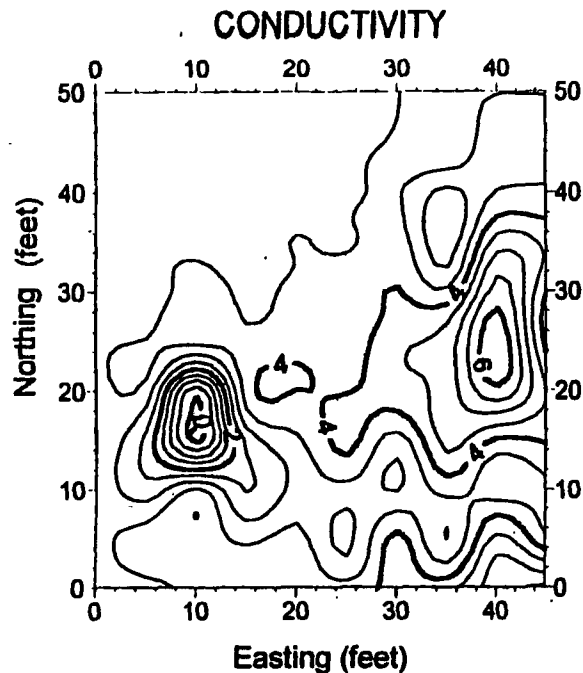
Original Scale: 1:24000

Map provided by EA. Source: USGS
East Greenwich and Wickford Quadrangle
- Rhode Island, 1942 (photorevised 1970 &
1975).

FIGURE 1
LOCATION OF THE SITE
NCBC DAVISVILLE
DAVISVILLE, RHODE ISLAND
Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
63 GREGORY STREET, WALTHAM, MA 02154

Hager GeoScience, Inc.



EXPLANATION

- GPR Traverse
- GPR Point Target (metal scrap, cobble, utility)
- - - Interpreted Utility
- Possible Septic Tank and Depth
- ▨ Possible Concrete Foundation
- Interpreted Septic Tank

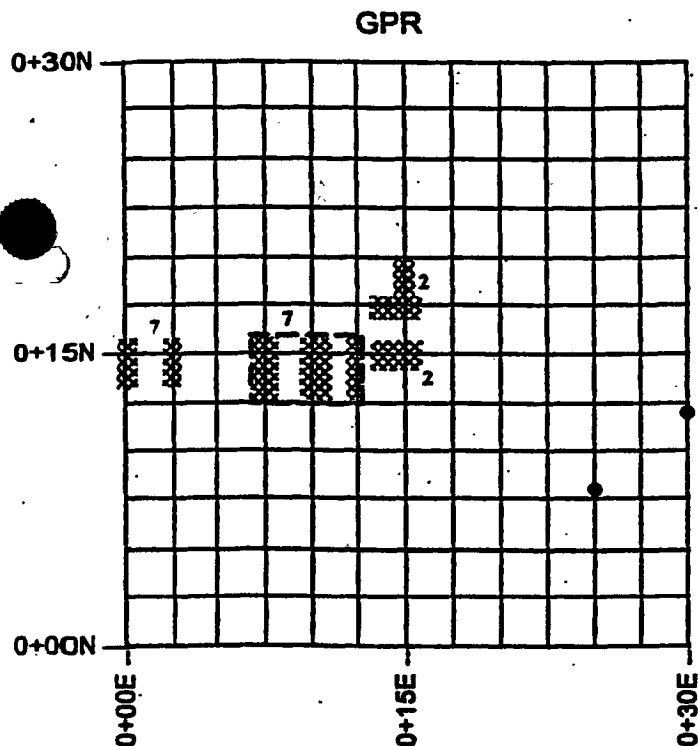
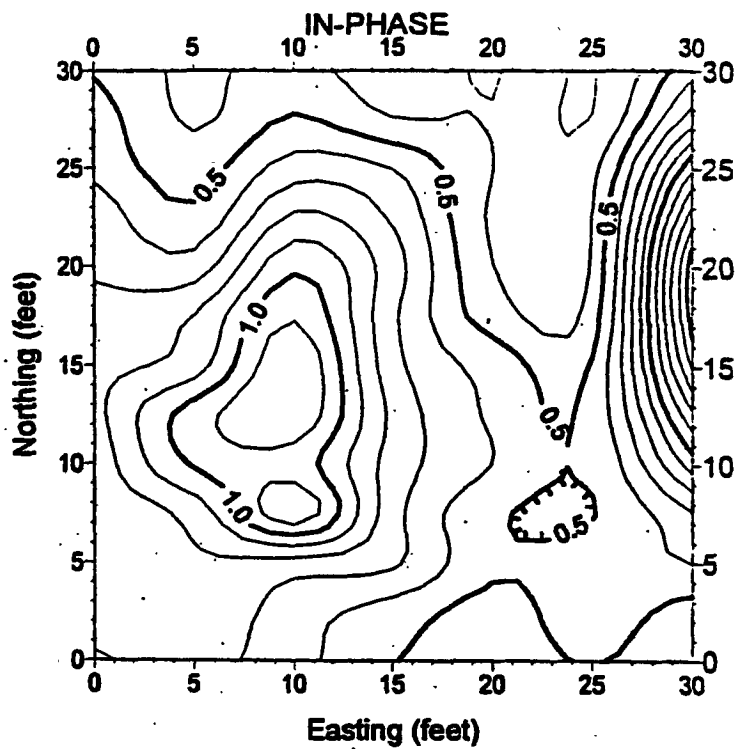
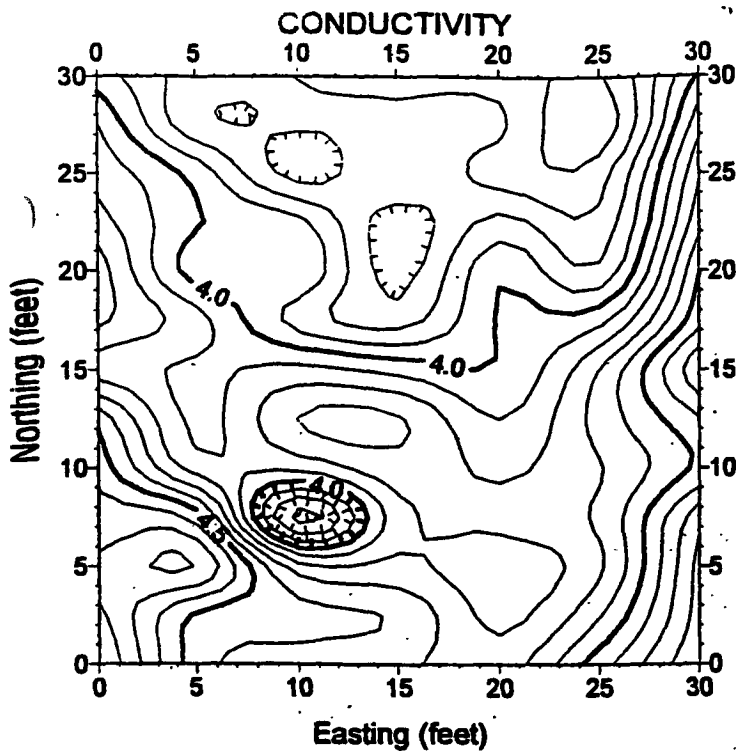
NOTES:

- 1) Sketch based on field notes.
- 2) EM31 conductivity contour interval is 0.5 millimho per meter (mmho/m).
- 3) EM31 in-phase contour interval is 1 part per thousand (ppt).
- 4) Magnetic contour interval = 200 gammas.
- 5) Interpreted depths are approximate, based on estimated GPR propagation velocities from similar sites (see text).

SCALE: 1 Inch = 20 Feet

FIGURE 2
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 40
DAVISVILLE, RI
 Prepared f r
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
 63 GREGORY STREET, WALTHAM, MA



EXPLANATION

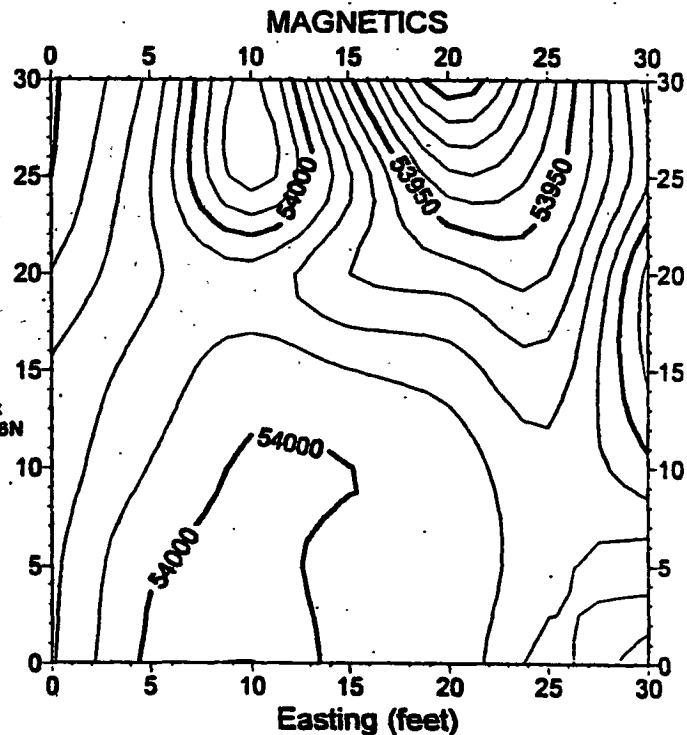
— GPR Traverse

GPR Point Target (metal scrap, cobble, utility)

--- Interpreted Utility

2 Possible Concrete Structure and Approx. Depth in Feet

☐ Interpreted Septic Tank

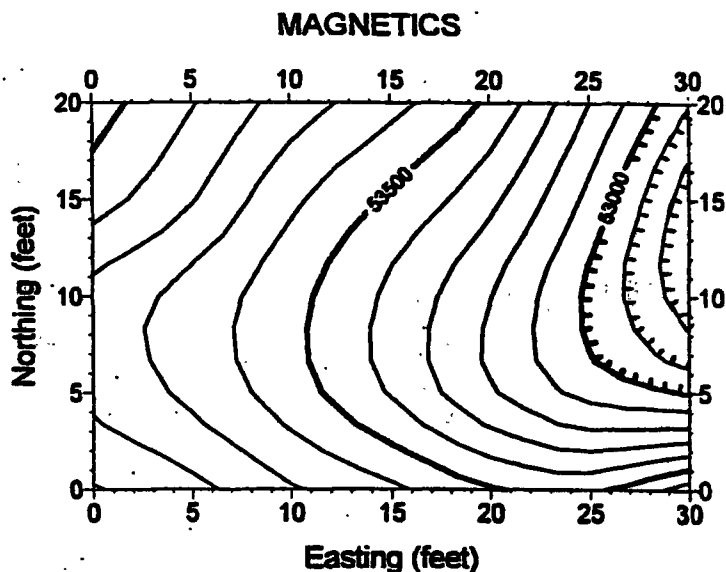
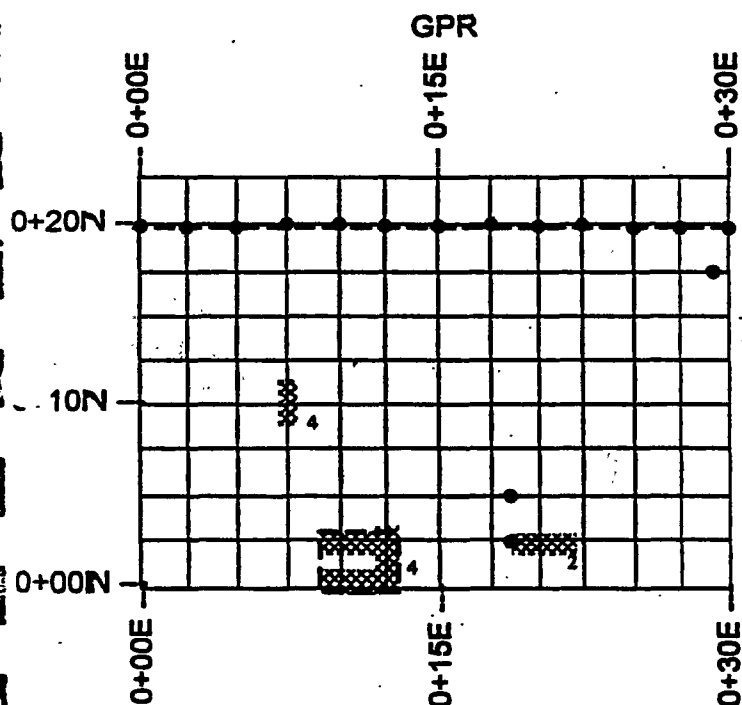
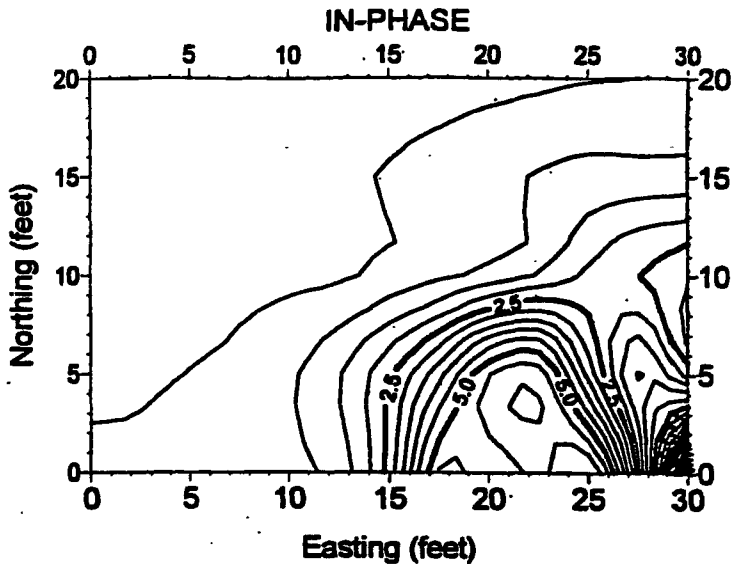


NOTES: Contour intervals are as marked;
see Figure 2 for additional notes.



SCALE: 1 Inch = 10 Feet

FIGURE 3
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 41A
DAVISVILLE, RHODE ISLAND
Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
63 GREGORY STREET, WALTHAM, MA 02154



— GPR Traverse

- **GPR Point Target (metal scrap, cobble, utility)**
- **Interpreted Utility**
- ²
 **Possible Concrete Structure and Approx. Depth in Feet**
-  **Interpreted Septic Tank**

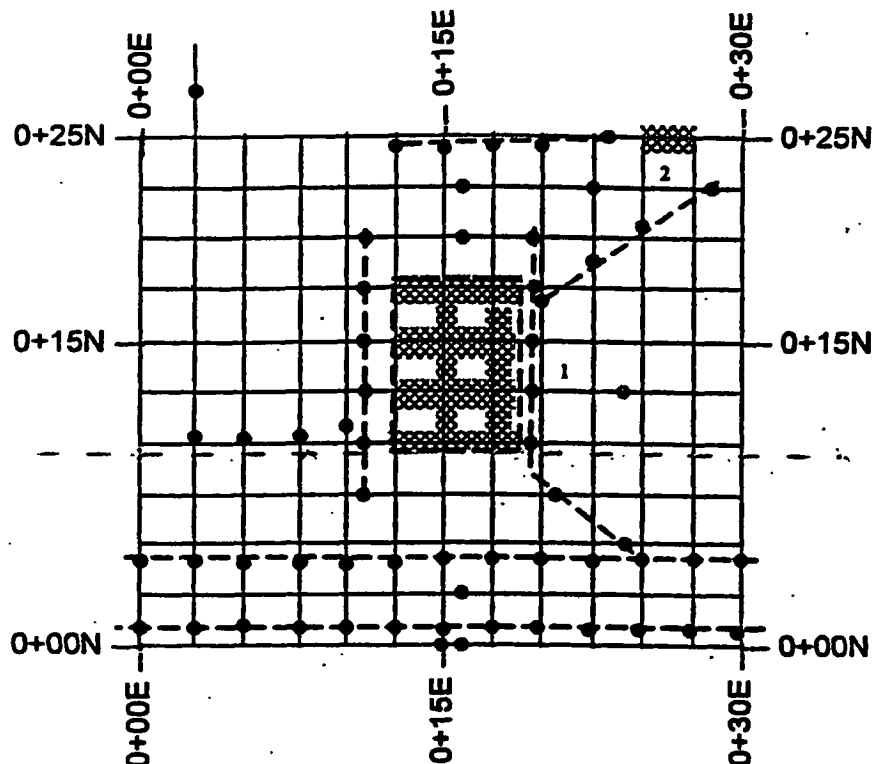
NOTES:

- 1) Plan based on sketch from field notes.
- 2) EM31 conductivity contour interval is 2.5 mmhos/m (mmho/m).
- 3) EM31 in-phase contour interval is 0.5 part per thousand (ppt).
- 4) Magnetic contour interval is 100 gammas.
- 5) Interpreted depths are based on estimated GPR propagation velocities from similar sites (see text).

SCALE: 1 Inch = 10 Feet

FIGURE 4
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 41B
DAVISVILLE, RHODE ISLAND
Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
63 GREGORY STREET, WALTHAM, MA 02154



Building 43

EXPLANATION

— GPR Traverse

GPR Point Target (metal
scrap, cobble, utility)

--- Interpreted Utility

 Possible Concrete Structure
and Approx. Depth in Feet

 Interpreted Septic Tank

NOTES:

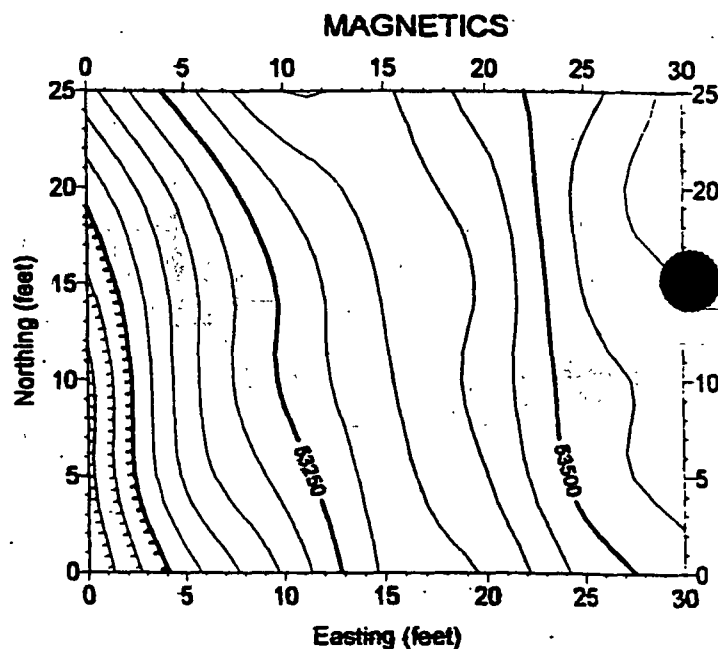
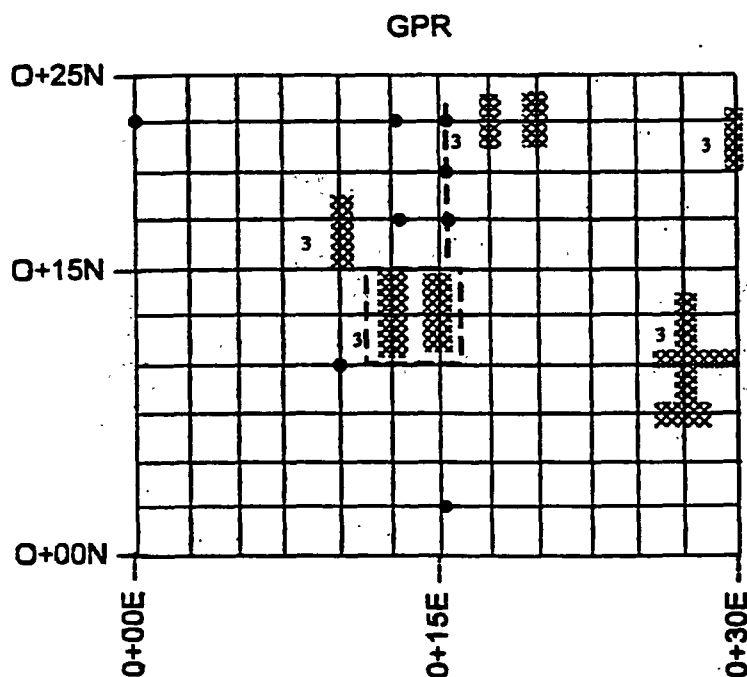
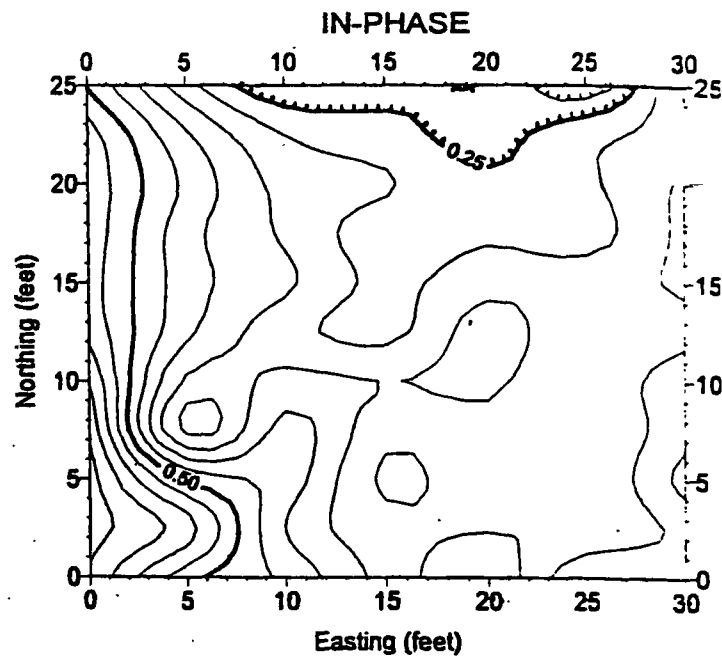
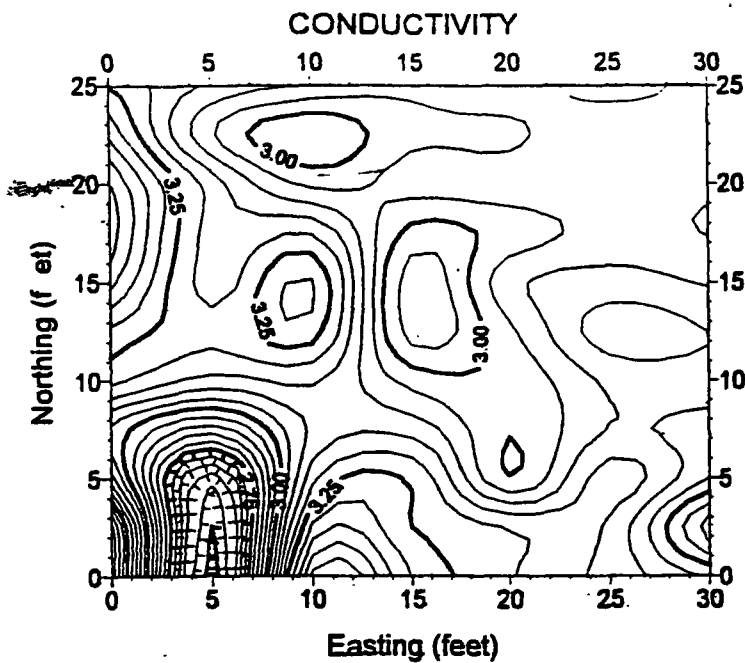
1) Plan based on sketch from field notes.

2) Interpreted depths are approximate, based
on estimated GPR propagation velocities from
similar sites (see text).

SCALE: 1 Inch = 10 Feet

FIGURE 5
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 42
DAVISVILLE, RHODE ISLAND
 Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
 63 GREGORY STREET, WALTHAM, MA 02154



NOTES:

1) EM conductivity, in-phase, and magnetic contour intervals are as marked.

2) Interpreted depths are approximate, based on estimated GPR propagation velocities from similar sites (see text).

SCALE: 1 inch = 10 Feet

EXPLANATION

— GPR Traverse

GPR Point Target (metal scrap, cobble, utility)

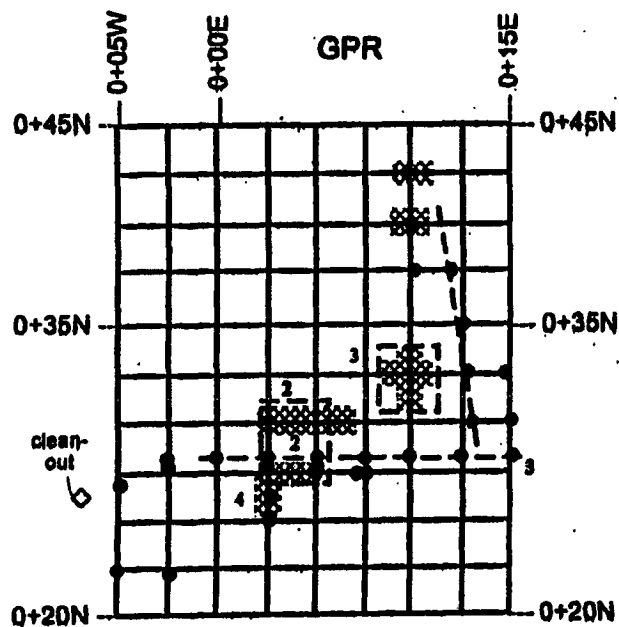
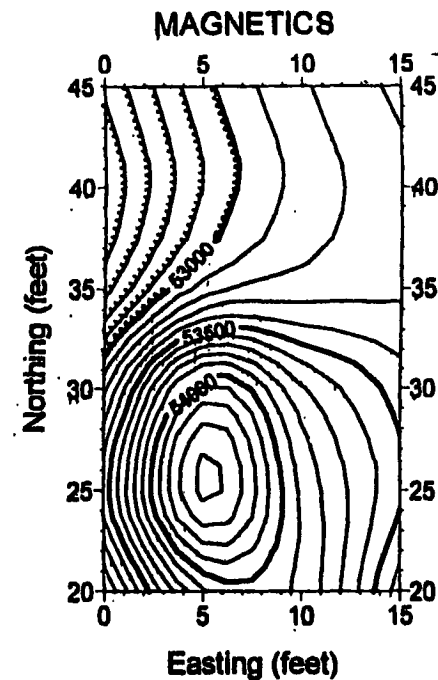
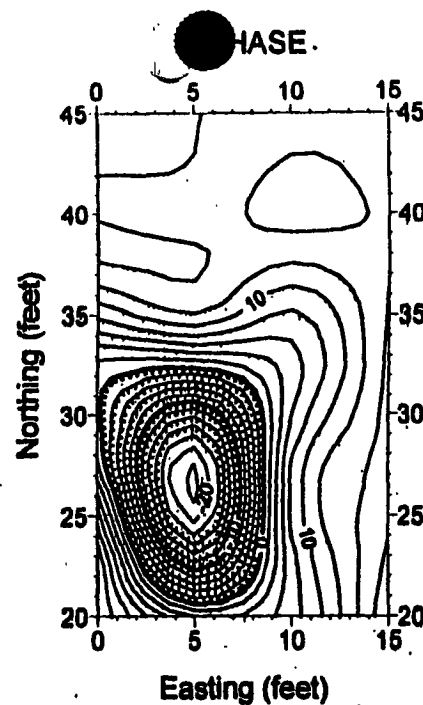
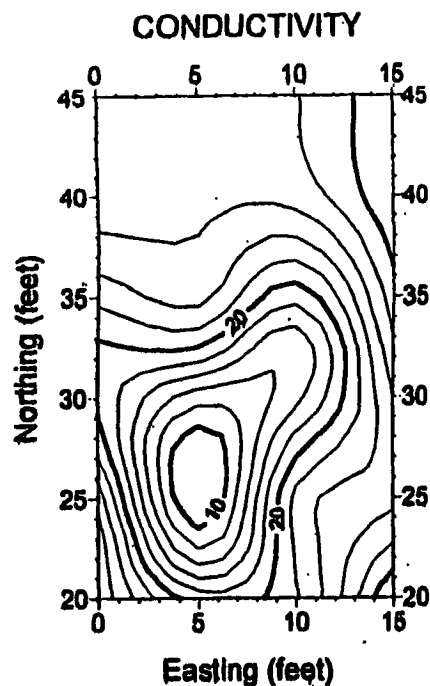
--- Interpreted Utility

 Possible Concrete Structure and Approx. Depth in Feet

 Interpreted Septic Tank

FIGURE 6
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 72
DAVISVILLE, RHODE ISLAND
Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
63 GREGORY STREET, WALTHAM, MA 02154



EXPLANATION

- GPR Traverse
- GPR Point Target (metal scrap, cobble, utility)
- Interpreted Utility
- 3 Possible Concrete Structure and Approx. Depth in Feet
- Possible Septic Tank
- ▣ Possible Excavation



NOTES:

- 1) Plan based on sketch from field notes.
- 2) EM31 conductivity contour interval is 2 mmhos/m (mmhos/m).
- 3) EM 31 in-phase contour interval is 2 parts per thousand (ppt).
- 4) Magnetic contour interval is 100 gammas.
- 5) Interpreted depths are based on estimated GPR propagation velocities from similar sites (see text).

SCALE: 1 Inch = 10 Feet

Grid Coordinate
0+00N, 0+00E
(not to scale)

Building 67 - Public Works

FIGURE 7
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 44
DAVISVILLE, RHODE ISLAND
Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
63 GREGORY STREET, WALTHAM, MA 02154

Warehouse
W-1

septic discharge pipe ?

0+20N

bushes

0+10N

0+10N

2

0+00N

0+00N

Road

0+00E

0+10E

0+25E

0+35E





NOTES:

1) Plan based on sketch from field notes.

2) Interpreted depths are approximate, based on estimated GPR propagation velocities from similar sites (see text).

EXPLANATION

- GPR Traverse
- GPR Point Target (metal scrap, cobble, utility)
- - - Interpreted Utility
-  2 Possible Concrete Structure and Approx. Depth in Feet
-  Interpreted Septic Tank

SCALE: 1 Inch = 10 Feet

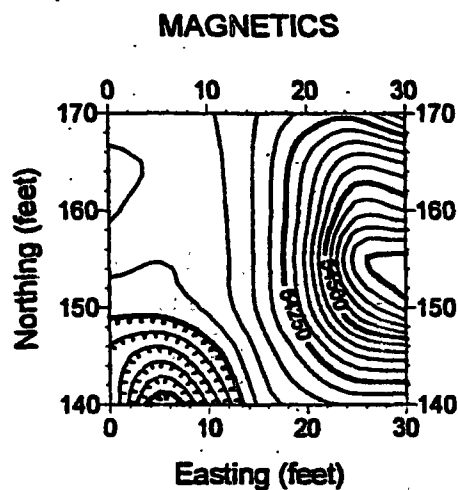
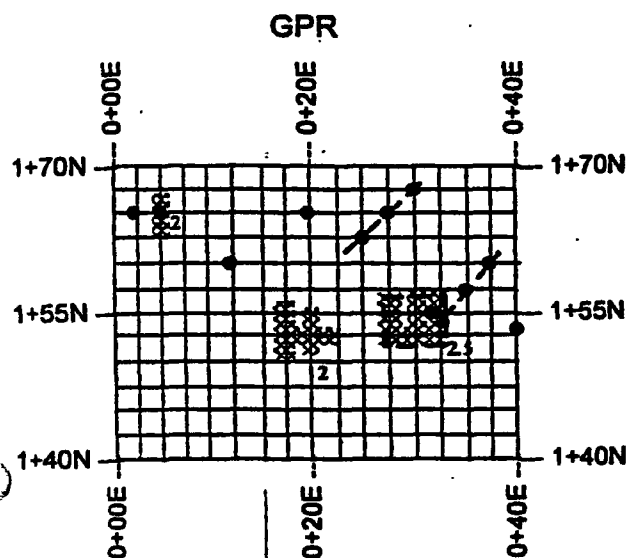
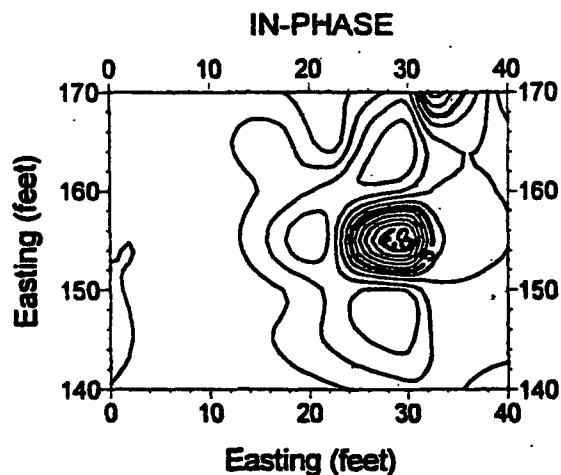
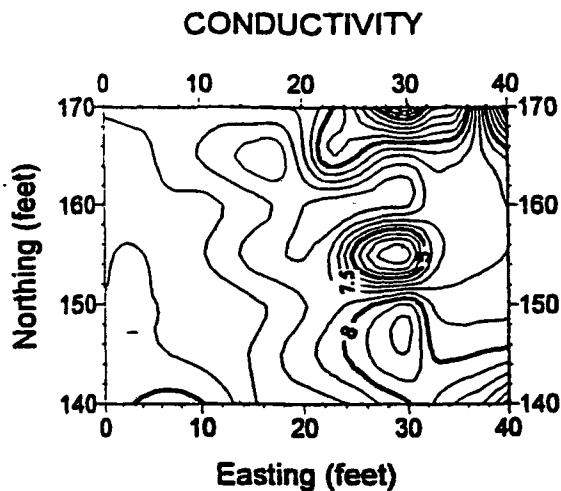
FIGURE 8
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 49

DAVISVILLE, RHODE ISLAND

Prepared for

EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
63 GREGORY STREET, WALTHAM, MA 02154



NOTES:

- 1) Plan based on sketch from field notes.
- 2) EM31 conductivity contour interval is 0.5 millimho per meter (mmho/m).
- 3) EM31 in-phase contour interval is 1 part per thousand (ppt.)
- 4) Magnetic contour interval is 50 gammas.
- 5) Interpreted depths are based on estimated GPR propagation velocities from similar sites (see text).

EXPLANATION

— GPR Traverse

- GPR Point Target (metal scrap, cobble, utility)

--- Interpreted Utility

- 2
▣ Possible Concrete Structure and Approx. Depth in Feet

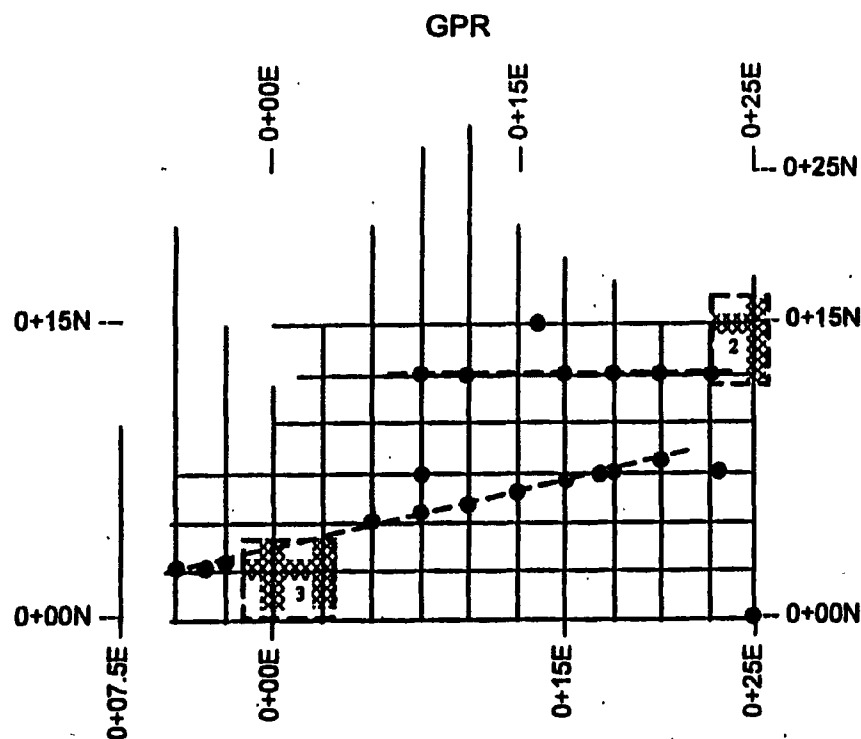
- ▣ Interpreted Septic Tank



SCALE: 1 Inch = 20 Feet

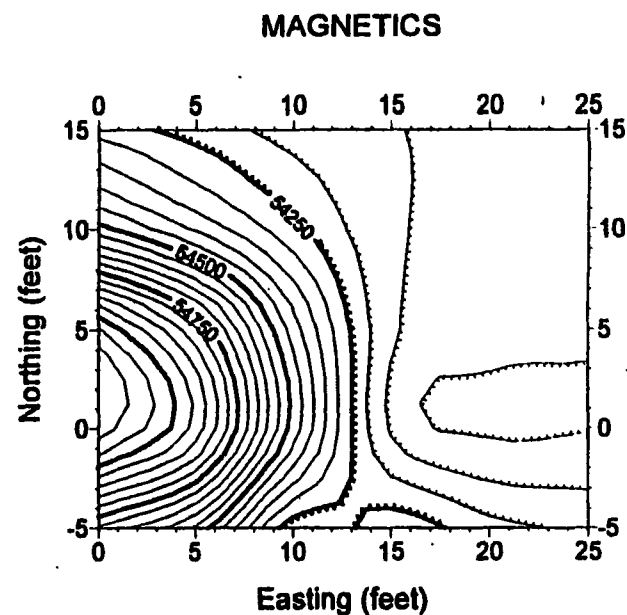
FIGURE 9
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 52
DAVISVILLE, RHODE ISLAND
 Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
 63 GREGORY STREET, WALTHAM, MA 02154



EXPLANATION

- GPR Traverse
- GPR Point Target (metal scrap, cobble, utility)
- Interpreted Utility
- ² Possible Concrete Structure and Approx. Depth in Feet
- [] Interpreted Septic Tank



NOTES:

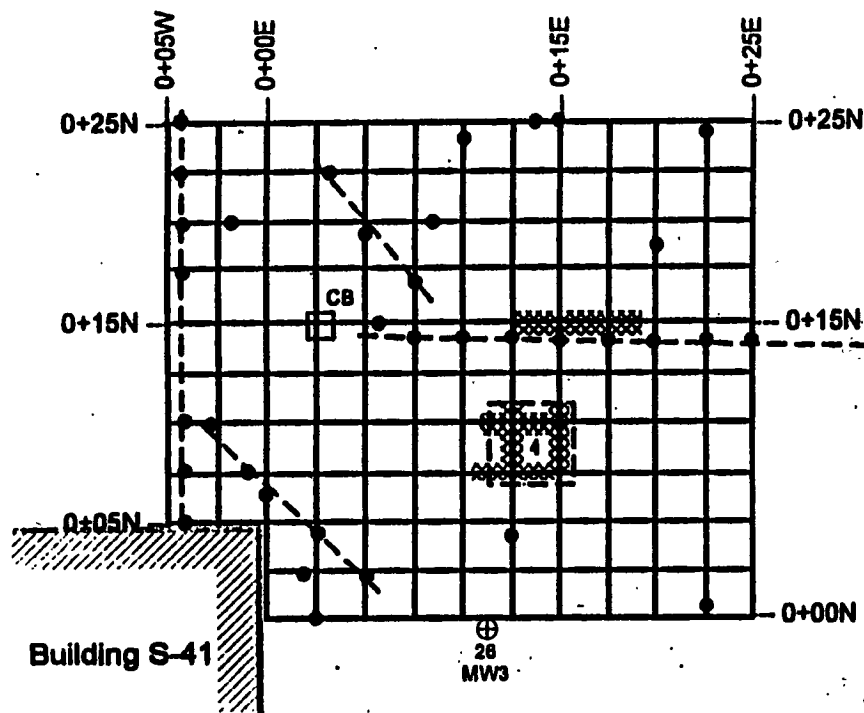
- 1) Plan based on sketch from field notes.
- 2) Magnetic contour interval is 50 gammas.
- 3) Interpreted depths are approximate, based on estimated GPR propagation velocities from similar sites (see text).

SCALE: 1 Inch = 10 Feet

FIGURE 10
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 53
DAVISVILLE, RHODE ISLAND
 Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
 63 GREGORY STREET, WALTHAM, MA 02154

SITE EBS 56A

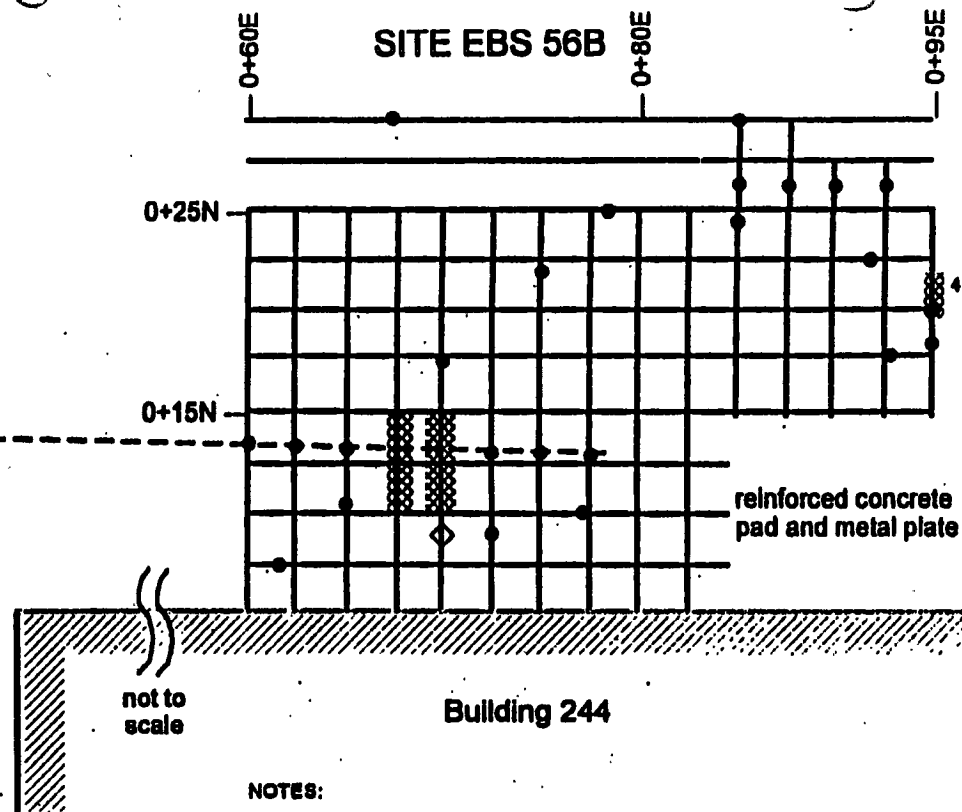


EXPLANATION

- ◇ Clean-Out
- GPR Traverse
- GPR Point Target (metal scrap, cobble, utility)
- Interpreted Utility
- 4 Possible Concrete Structure and Approx. Depth in Feet
- Interpret d S ptic Tank
- Possibl Excavation



SITE EBS 56B



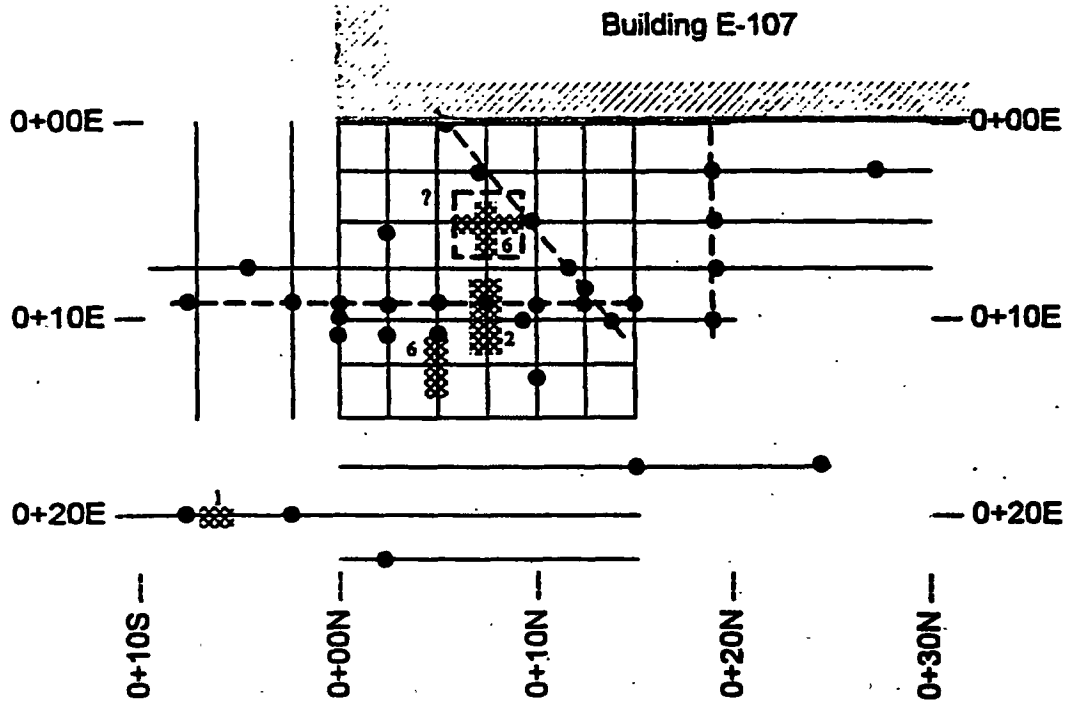
NOTES:

- 1) Plan based on sketch from field notes.
- 2) Interpreted depths are approximate, based on estimated GPR propagation velocities from similar sites (see text).

SCALE: 1 Inch =10 Feet

FIGURE 11
INTERPRETED GEOPHYSICAL RESULTS
SITES EBS 56A AND 56B
DAVISVILLE, RHODE ISLAND
 Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
 63 REGORY STREET, WALTHAM, MA 02154



EXPLANATION

- GPR Traverse
- GPR Point Target (metal scrap, cobble, utility)
- - - Interpreted Utility
- 4
Large Utility or Concrete Structure and Approx. Depth in Feet
- Interpreted Septic Tank

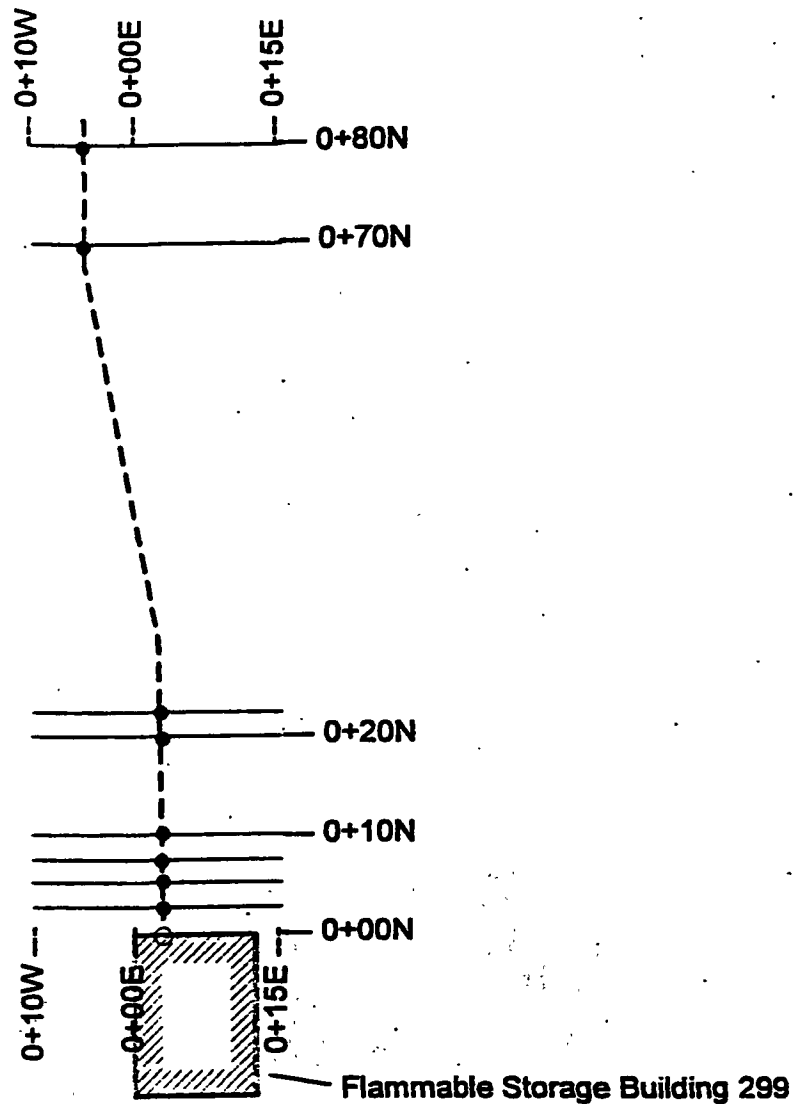
NOTES:

- 1) Plan based on sketch from field notes.
- 2) Interpreted depths are approximate, based on estimated GPR propagation velocities from similar sites (see text).

SCALE: 1 Inch = 10 Feet

FIGURE 12
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 60
DAVISVILLE, RHODE ISLAND
 Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
 63 GREGORY STREET, WALTHAM, MA 02154



NOTES:

- 1) Plan based on sketch from field notes.
- 2) Interpreted depths are approximate, based on estimated GPR propagation velocities from similar sites (see text).
- 3) The pipe was not detected by a GPR traverse at 1+60N, immediately beyond the catch basin.

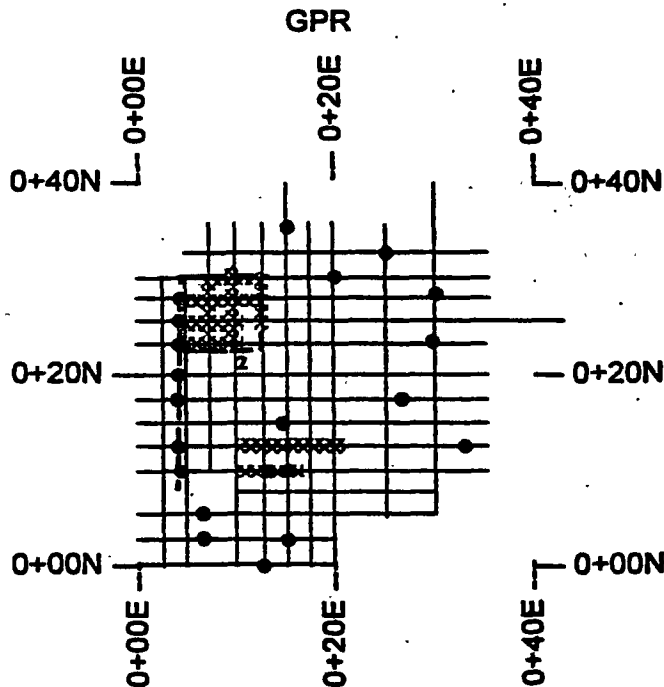
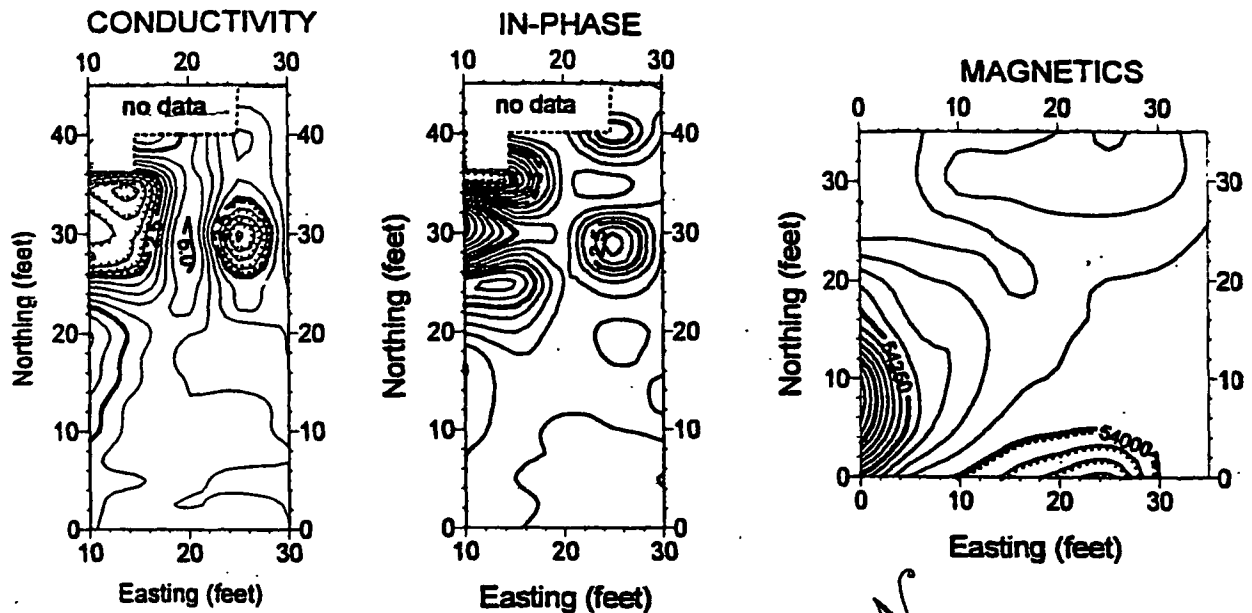
SCALE: 1 Inch = 20 Feet

EXPLANATION

- Possible Septic Pipe
- GPR Traverse
- GPR Point Target (metal scrap, cobble, utility)
- Interpreted Utility

FIGURE 13
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 77
DAVISVILLE, RHODE ISLAND
 Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
 63 GREGORY STREET, WALTHAM, MA 02154



EXPLANATION

- GPR Traverse
- GPR Point Target (metal scrap, cobble, utility)
- Interpreted Utility
- Possible Concrete Structure and Approx. Depth in Feet
- Interpreted Septic Tank
- Possible Excavation

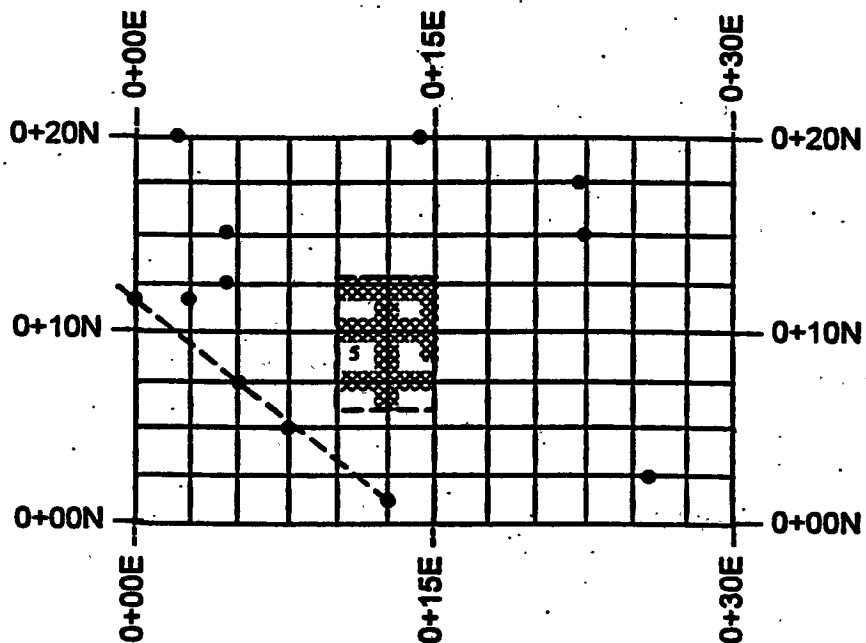
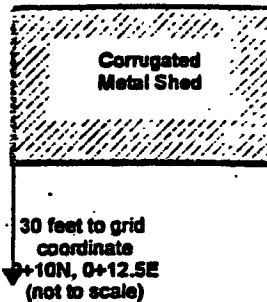
SCALE: 1 Inch = 20 Feet

NOTES:

- 1) Plan based on sketch from field notes.
- 2) EM31 conductivity contour interval is 0.5 millimho per meter (mmho/m).
- 3) EM31 in-phase contour interval is 0.5 part per thousand (ppt).
- 4) Magnetic contour interval is 50 gammas.
- 5) Interpreted depths are approximate, based on estimated GPR propagation velocities from similar sites (see text).

FIGURE 14
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 87/60
DAVISVILLE, RHODE ISLAND
Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
63 GREGORY STREET, WALTHAM, MA 02154



NOTES:

- 1) Plan based on sketch from field notes.
- 2) Interpreted depths are approximate, based on estimated GPR propagation velocities from similar sites (see text).

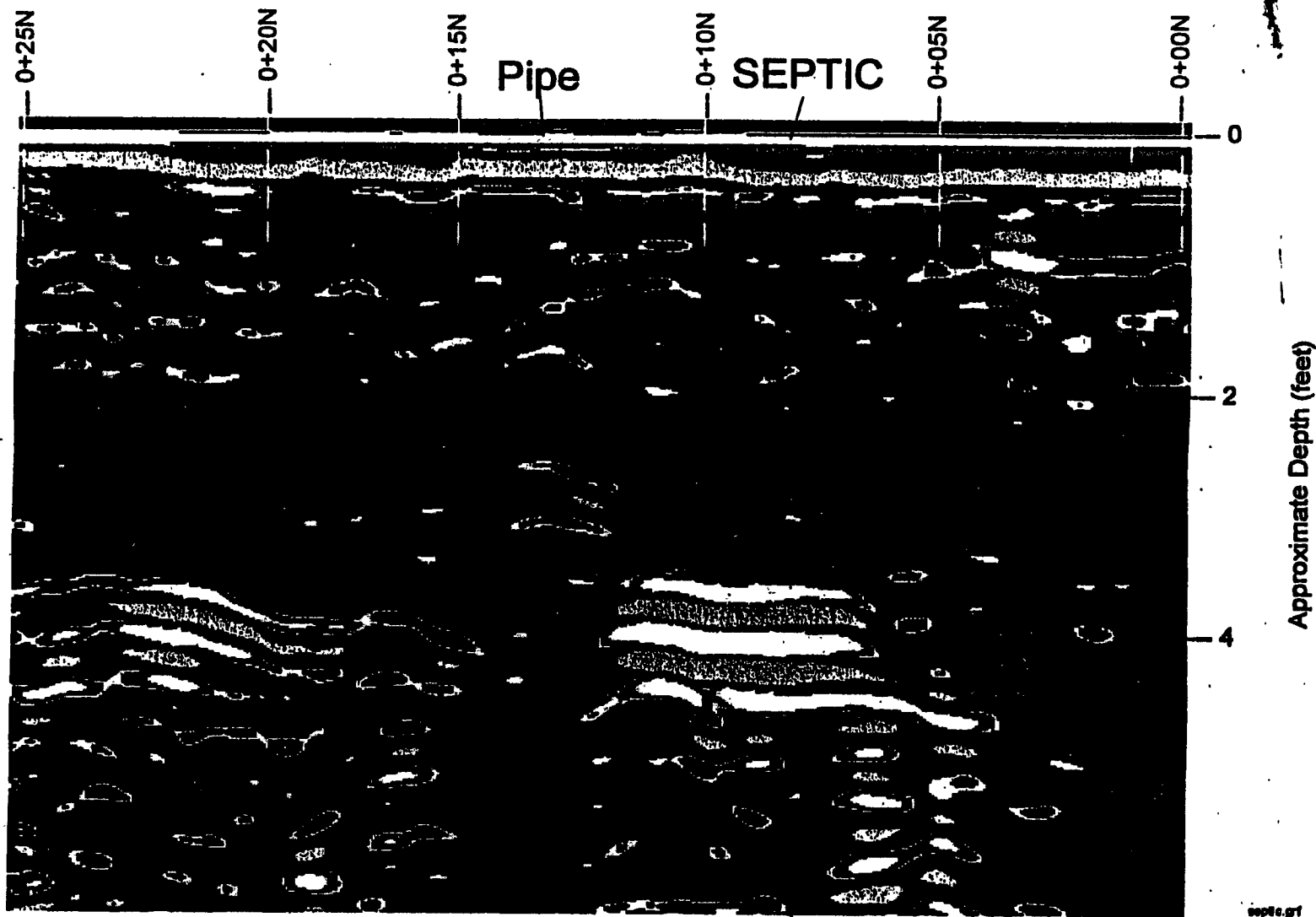
EXPLANATION

- GPR Traverse
- GPR Point Target (metal scrap, cobble, utility)
- Interpreted Utility
- Possible Septic Tank and Approx. Depth in Feet
- Interpreted Septic Tank

SCALE: 1 Inch = 10 Feet

FIGURE 15
INTERPRETED GEOPHYSICAL RESULTS
SITE EBS 36
DAVISVILLE, RHODE ISLAND
 Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996

HAGER GEOSCIENCE, INC.
 63 GREGORY STREET, WALTHAM, MA 02154



NOTE:

Interpreted depths are approximate, based on estimated GPR propagation velocities from similar sites (see text).

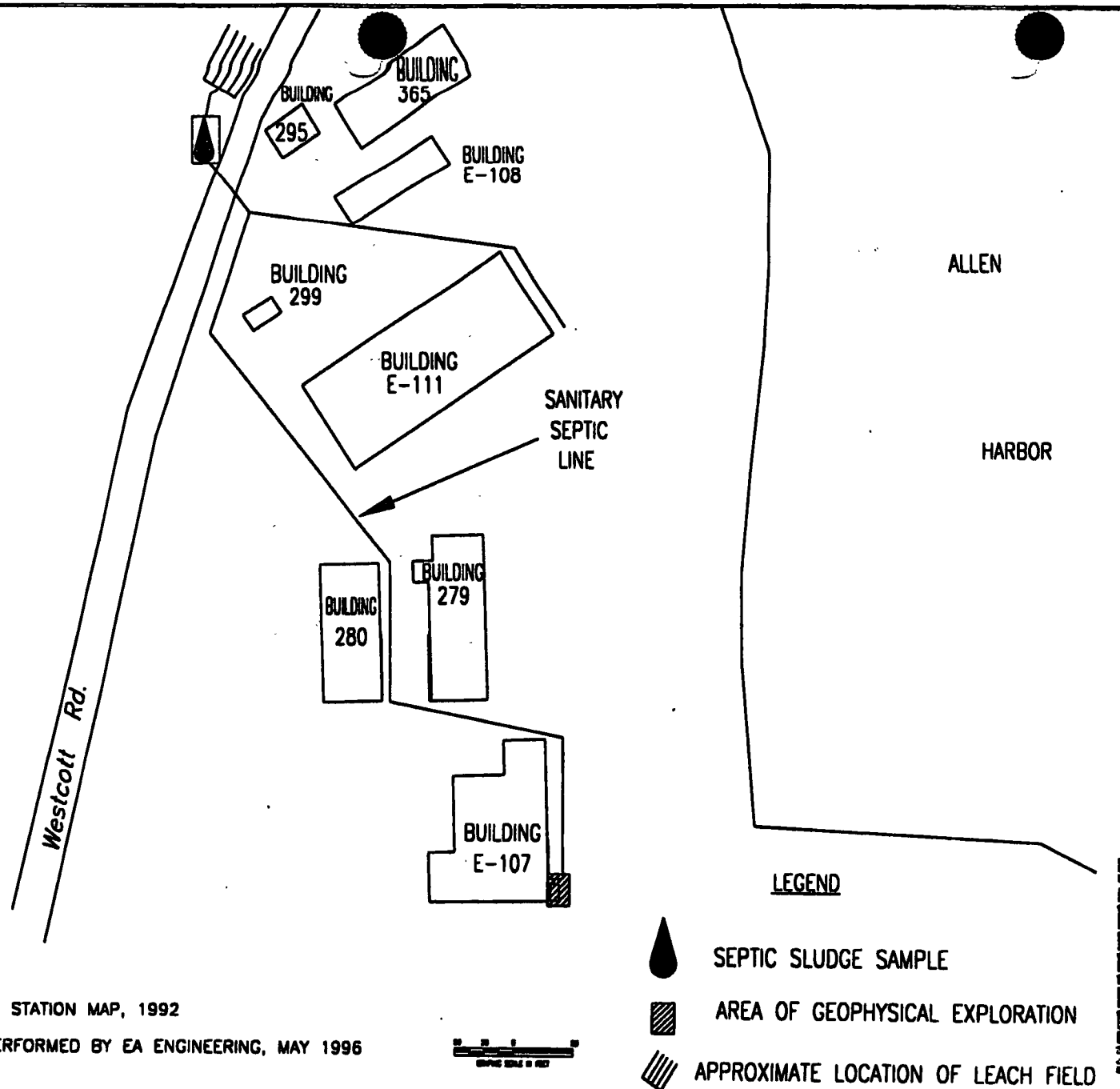
**FIGURE 16
EXAMPLE GPR RECORD OF SEPTIC TANK
SITE 68A**

DAVISVILLE, RI

**Prepared for
EA ENGINEERING, SCIENCE, AND TECHNOLOGY
APRIL 1996**

HAGER GEOSCIENCE, INC.

83 REGENT STREET, WALTHAM, MA 01901



NOTES: 1) ORIGINAL MAP SOURCE: NCBC STATION MAP, 1992

2) SAMPLE LOCATION SURVEY PERFORMED BY EA ENGINEERING, MAY 1996



SEPTIC SLUDGE SAMPLE



AREA OF GEOPHYSICAL EXPLORATION



APPROXIMATE LOCATION OF LEACH FIELD



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY

DESIGNED BY
JFW

DRAWN BY
JFW

DATE
11-1-96

CHECKED BY
JMC

PROJECT MGR.
JMC

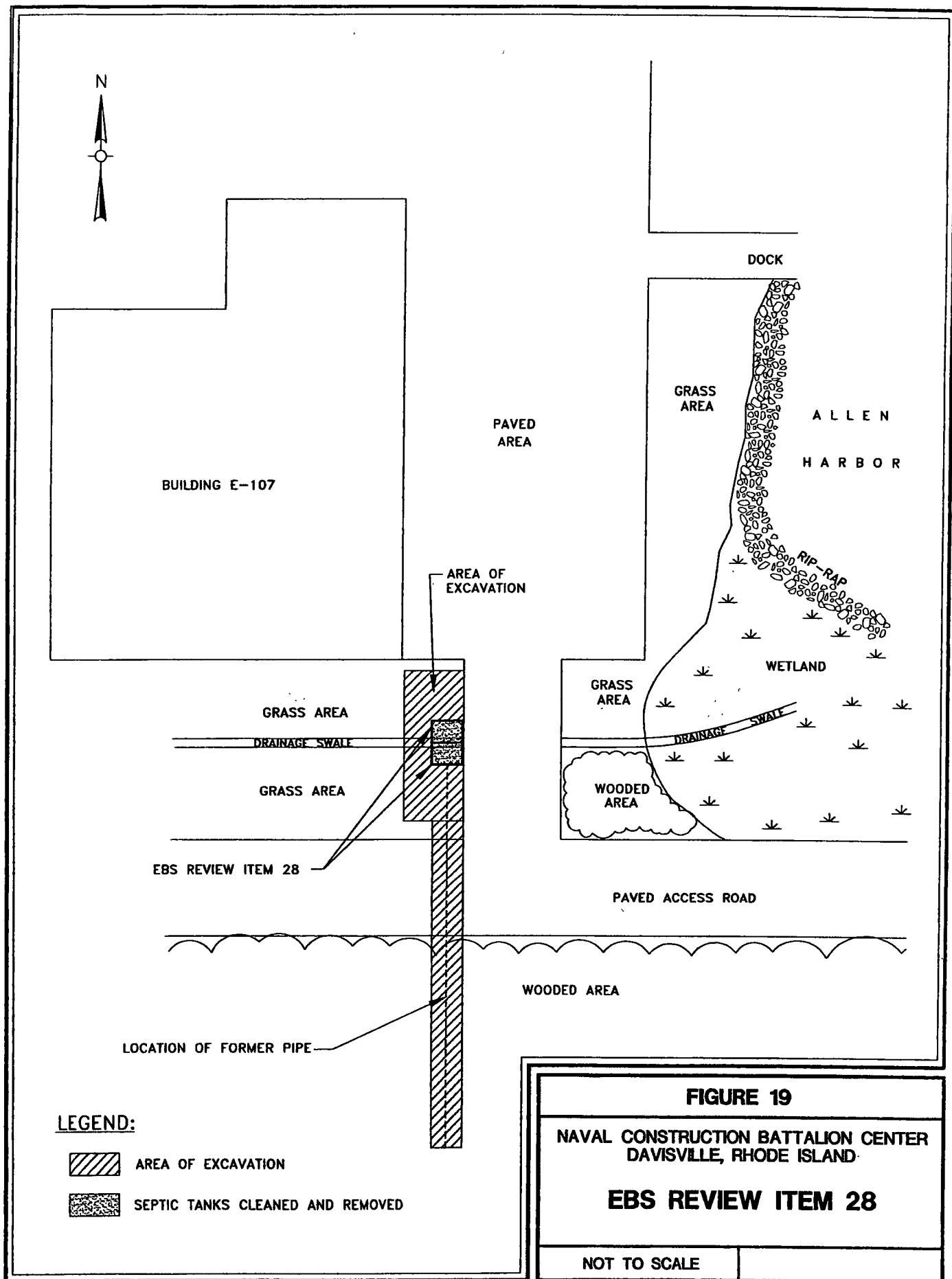
SCALE
AS SHOWN

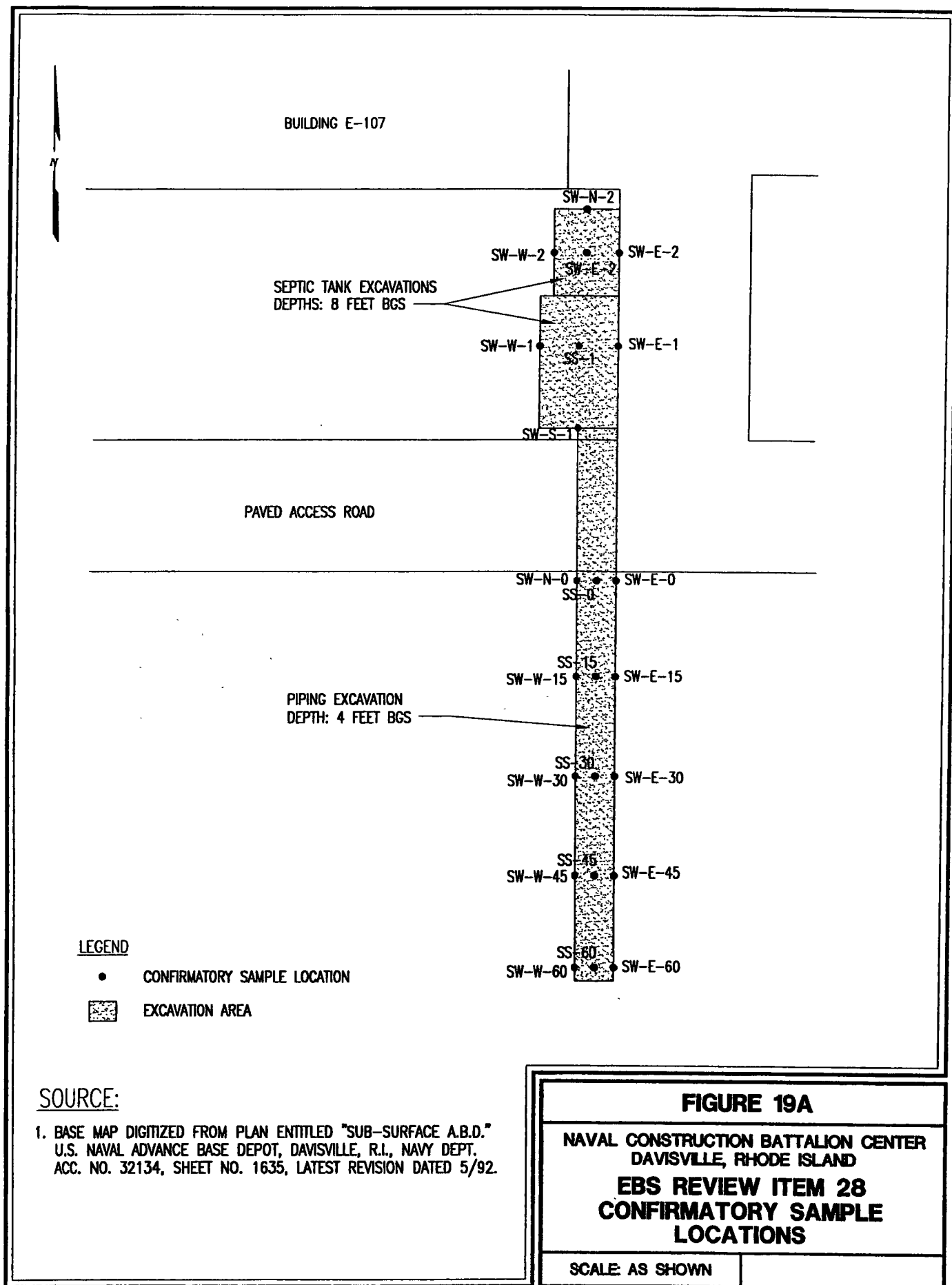
NCBC, DAVISVILLE
ENVIRONMENTAL BASELINE
SURVEY (EBS)
FINAL PHASE II EBS REPORT
DAVISVILLE, RHODE ISLAND

REVIEW ITEM 60
BUILDING E-107
SEPTIC SAMPLE LOCATION
MAP

PROJECT NO.
29600.60.2290

FIGURE
5-27





EBS Review Item 28
TPH Field Screening Sample Results

SAMPLING DATE	SAMPLE IDENTIFICATION	FIELD RESULT (ppm)	SAMPLING ROUND	COMMENT
12/09/97	EBS28-SS-1	1,132	Round I	Floor of excavation No. 1
12/09/97	EBS28-SW-E-1	776	Round I	East sidewall of excavation No. 1
12/09/97	EBS28-SW-S-1	716	Round I	South sidewall of excavation No. 1
12/09/97	EBS28-SW-W-1	142	Round I	West sidewall of excavation No. 1
12/09/97	EBS28-SS-2	1,184	Round I	Floor of excavation No. 2
12/09/97	EBS28-SW-N-2	242	Round I	North sidewall of excavation No. 2
12/09/97	EBS28-SW-E-2	2,360	Round I	East sidewall of excavation No. 2
12/15/97	EBS28-SW-E-2	670	Round II	East sidewall of excavation No. 2
12/09/97	EBS28-SW-W-2	812	Round I	West sidewall of excavation No. 2
12/15/97	EBS28-SW-W-2	38	Round II	West sidewall of excavation No. 2
12/10/97	EBS28-PIPE-SS-0	922	Round I	Floor of pipe trench at 0 ft.
12/10/97	EBS28-PIPE-SWE-0	386	Round I	East sidewall of pipe trench at 0 ft.
12/10/97	EBS28-PIPE-SWW-0	670	Round I	West sidewall of pipe trench at 0 ft.
12/10/97	EBS28-PIPE-SS-15	1,154	Round I	Floor of pipe trench at 15 ft.
12/17/97	EBS28-PIPE-SS-15	1,734	Round II	Floor of pipe trench at 15 ft.
12/17/97	EBS28-PIPE-SS-15	250	Round III	Floor of pipe trench at 15 ft.
12/10/97	EBS28-PIPE-SWE-15	256	Round I	East sidewall of pipe trench at 15 ft.
12/10/97	EBS28-PIPE-SWW-15	152	Round I	West sidewall of pipe trench at 15 ft.
12/10/97	EBS28-PIPE-SS-30	530	Round I	Floor of pipe trench at 30 ft.
12/10/97	EBS28-PIPE-SWE-30	590	Round I	East sidewall of pipe trench at 30 ft.
12/10/97	EBS28-PIPE-SWW-30	728	Round I	West sidewall of pipe trench at 30 ft.
12/10/97	EBS28-PIPE-SS-45	618	Round I	Floor of pipe trench at 45 ft.
12/10/97	EBS28-PIPE-SWE-45	546	Round I	East sidewall of pipe trench at 45 ft.
12/10/97	EBS28-PIPE-SWW-45	576	Round I	West sidewall of pipe trench at 45 ft.
12/10/97	EBS28-PIPE-SS-60	550	Round I	Floor of pipe trench at 60 ft.
12/10/97	EBS28-PIPE-SWE-60	248	Round I	East sidewall of pipe trench at 60 ft.
12/10/97	EBS28-PIPE-SWW-60	340	Round I	West sidewall of pipe trench at 60 ft.

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SS-1 12/9/97	EBS28-SW-E-1 12/9/97
TPH (field screening)	-	1,132	776
TPH-IR (Method 418.1)	2,500*	800	170
TPH-GRO (Method 8015M)	2,500*	2.4	ND
VOCs (Method 8260)			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	0.020	0.018
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	ND	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	ND	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SS-1 12/9/97	EBS28-SW-E-1 12/9/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	ND	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	ND	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	ND	ND
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	0.044 J	ND
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SS-1 12/9/97	EBS28-SW-E-1 12/9/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnapthalene	10,000	ND	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronapthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	ND	ND
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	0.870	0.083 J
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	0.140 J	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	0.560	0.068 J
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	1.60	0.240 J
Anthracene	10,000	1.10	0.120 J
Di-n-butylphthalate	-	ND	ND
Carbazole	-	0.140 J	ND
Fluoranthene	10,000	3.20	0.410
Pyrene	10,000	2.50	0.270 J
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	0.720	0.130 J
Chrysene	780	0.760	0.200 J
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	0.049 J	ND
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	0.600	0.160 J
Benzo(k)fluoranthene	78	0.310 J	0.054 J
Benzo(a)pyrene	0.8	0.440	0.094 J
Indeno(1,2,3-cd)pyrene	7.8	0.110 J	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SS-1 12/9/97	EBS28-SW-E-1 12/9/97
Dibenzo(a,h)anthracene	0.8	ND	ND
Benzo(g,h,i)perylene	10,000	0.110 J	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria	EBS28-SW-S-1	EBS28-SW-W-1
	Industrial/Commercial	12/9/97	12/9/97
TPH (field screening)	-	716	142
TPH-IR (Method 418.1)	2,500*	170	ND
TPH-GRO (Method 8015M)	2,500*	-	-
VOCs (Method 8260)			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	ND	0.007
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	ND	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	ND	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SW-S-1 12/9/97	EBS28-SW-W-1 12/9/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	ND	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	ND	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	ND	ND
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	0.043 J	ND
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	ND	ND
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SW-S-1 12/9/97	EBS28-SW-W-1 12/9/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnapthalene	10,000	ND	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronapthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	ND	ND
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	ND	ND
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	ND	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	ND	ND
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	ND	ND
Anthracene	10,000	ND	ND
Di-n-butylphthalate	-	ND	ND
Carbazole	-	ND	ND
Fluoranthene	10,000	0.056 J	ND
Pyrene	10,000	0.050 J	ND
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	0.064 J	ND
Chrysene	780	0.110 J	ND
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	ND	ND
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	0.099 J	ND
Benzo(k)fluoranthene	78	ND	ND
Benzo(a)pyrene	0.8	0.059 J	ND
Indeno(1,2,3-cd)pyrene	7.8	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SW-S-1 12/9/97	EBS28-SW-W-1 12/9/97
Dibenzo(a,h)anthracene	0.8	ND	ND
Benzo(g,h,i)perylene	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SS-2 12/9/97	EBS28-SW-N-2 12/9/97
TPH (field screening)	-	1,184	242
TPH-IR (Method 418.1)	2,500*	720	90
TPH-GRO (Method 8015M)	2,500*	0.9	ND
<i>VOCs (Method 8260)</i>			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	0.012	ND
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	ND	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	0.042	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SS-1 12/9/97	EBS28-SW-N-1 12/9/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	0.009	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	0.030	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	0.012	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	ND	ND
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	ND	ND
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SS-2 12/9/97	EBS28-SW-N-2 12/9/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnapthalene	10,000	ND	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronapthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	ND	ND
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	0.230 J	ND
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	ND	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	0.100 J	ND
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	0.330 J	0.063 J
Anthracene	10,000	0.310 J	ND
Di-n-butylphthalate	-	ND	ND
Carbazole	-	ND	ND
Fluoranthene	10,000	1.40	0.097 J
Pyrene	10,000	0.690	0.091 J
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	0.320 J	0.065 J
Chrysene	780	0.400 J	0.077
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	ND	ND
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	0.330 J	0.085 J
Benzo(k)fluoranthene	78	0.130 J	ND
Benzo(a)pyrene	0.8	0.220 J	0.060 J
Indeno(1,2,3-cd)pyrene	7.8	0.048 J	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SS-1 12/9/97	EBS28-SW-N-2 12/9/97
Dibenzo(a,h)anthracene	0.8	ND	ND
Benzo(g,h,i)perylene	10,000	0.045 J	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SW-E-2 12/9/97	EBS28-SW-E-2 12/15/97
TPH (field screening)	-	2,360	670
TPH-IR (Method 418.1)	2,500*	1,600	98
TPH-GRO (Method 8015M)	2,500*	-	ND
<i>VOCs (Method 8260)</i>			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	0.030	0.022
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	0.011	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	ND	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SW-E-2 12/9/97	EBS28-SW-E-2 12/15/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	ND	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	ND	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	0.010	ND
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	0.067 J	ND
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SW-E-2 12/9/97	EBS28-SW-E-2 12/15/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnapthalene	10,000	0.085 J	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronapthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	ND	ND
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	1.70	ND
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	0.140 J	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	0.640	ND
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	1.80	0.046 J
Anthracene	10,000	1.50	ND
Di-n-butylphthalate	-	ND	ND
Carbazole	-	0.043 J	ND
Fluoranthene	10,000	5.40	0.078 J
Pyrene	10,000	4.70	0.072 J
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	1.30	ND
Chrysene	780	1.70	0.061 J
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	0.180 J	ND
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	1.70	0.068 J
Benzo(k)fluoranthene	78	0.710	0.073 J
Benzo(a)pyrene	0.8	0.990	0.044 J
Indeno(1,2,3-cd)pyrene	7.8	0.150 J	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SW-E-2 12/9/97	EBS28-SW-E-2 12/15/97
Dibenzo(a,h)anthracene	0.8	0.060 J	ND
Benzo(g,h,i)perylene	10,000	0.120 J	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SW-W-2 12/9/97	EBS28-SW-W-2 12/15/97
TPH (field screening)	-	812	38
TPH-IR (Method 418.1)	2,500*	740	ND
TPH-GRO (Method 8015M)	2,500*	-	ND
VOCs (Method 8260)			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	0.009	ND
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	ND	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	ND	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SW-W-1 12/9/97	EBS28-SW-W-2 12/15/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	ND	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	ND	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	ND	ND
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	6.10	ND
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SW-W-2 12/9/97	EBS28-SW-W-2 12/15/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnapthalene	10,000	3.90	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronapthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	ND	ND
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	38.0	ND
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	21.0	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	ND	ND
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	200	ND
Anthracene	10,000	75.0	ND
Di-n-butylphthalate	-	ND	ND
Carbazole	-	29.0	ND
Fluoranthene	10,000	180	ND
Pyrene	10,000	140	ND
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	82.0	ND
Chrysene	780	83.0	ND
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	ND	ND
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	81.0	ND
Benzo(k)fluoranthene	78	30.0	ND
Benzo(a)pyrene	0.8	62.0	ND
Indeno(1,2,3-cd)pyrene	7.8	12.0	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SW-W-2 12/9/97	EBS28-SW-W-2 12/15/97
Dibenzo(a,h)anthracene	0.8	5.60	ND
Benzo(g,h,i)perylene	10,000	11.0	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Septic Tank/TPH Excavation Pesticide Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-SW-N 12/11/97	EBS28-SW-E 12/11/97	EBS28-SW-W 12/11/97
<i>PEST/PCBs (Method 8080)</i>				
alpha-BHC	-	ND	ND	ND
gamma-BHC	-	ND	ND	ND
Heptachlor	-	ND	ND	ND
Aldrin	-	ND	ND	ND
beta-BHC	-	ND	ND	ND
delta-BHC	-	ND	ND	ND
Heptachlor epoxide	-	ND	ND	ND
Endosulfan I	-	ND	ND	ND
4,4'-DDE	-	ND	ND	ND
Dieldrin	0.4	ND	ND	ND
Endrin	-	ND	ND	ND
4,4'-DDD	-	ND	ND	ND
Endosulfan II	-	ND	ND	ND
4,4'-DDT	-	ND	ND	ND
Endrin ketone	-	ND	ND	ND
Endrin aldehyde	-	ND	ND	ND
Methoxychlor	-	ND	ND	ND
Endosulfan sulfate	-	ND	ND	ND
alpha-Chlordane	4.4	ND	ND	ND
gamma-Chlordane	4.4	ND	ND	ND
Toxaphene	-	ND	ND	ND
PCBs (total)	10	ND	ND	ND

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SS-0 12/10/97	EBS28-PIPE-SWE-0 12/10/97
TPH (field screening)	-	922	386
TPH-IR (Method 418.1)	2,500*	1,300	86
TPH-GRO (Method 8015M)	2,500*	ND	-
VOCs (Method 8260)			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	ND	ND
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	ND	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	ND	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SS-0 12/10/97	EBS28-PIPE-SWE-0 12/10/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	ND	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	ND	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	ND	ND
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	0.062 J	ND
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	ND	ND
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SS-0 12/10/97	EBS28-PIPE-SWE-0 12/10/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnapthalene	10,000	ND	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronapthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	0.110 J	0.110 J
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	ND	ND
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	ND	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	ND	ND
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	0.130 J	ND
Anthracene	10,000	0.210 J	0.150 J
Di-n-butylphthalate	-	ND	ND
Carbazole	-	ND	ND
Fluoranthene	10,000	0.500	0.100 J
Pyrene	10,000	0.680	0.100 J
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	0.370 J	0.180 J
Chrysene	780	0.720	0.430
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	0.048 J	ND
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	1.20	0.990
Benzo(k)fluoranthene	78	0.430	0.280 J
Benzo(a)pyrene	0.8	0.730	0.650
Indeno(1,2,3-cd)pyrene	7.8	0.320 J	0.340 J

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SS-0 12/10/97	EBS28-PIPE-SWE-0 12/10/97
Dibenzo(a,h)anthracene	0.8	0.110 J	0.110 J
Benzo(g,h,i)perylene	10,000	0.310 J	0.350 J

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28 PIPE-SWW-0 12/10/97	EBS28 PIPE-SS-15 12/10/97
TPH (field screening)	-	670	1,154
TPH-IR (Method 418.1)	2,500*	500	1,700
TPH-GRO (Method 8015M)	2,500*	-	ND
<i>VOCs (Method 8260)</i>			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	ND	0.006
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	ND	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	ND	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWW-0 12/10/97	EBS28-PIPE-SS-15 12/10/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	ND	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	ND	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	ND	0.009
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	ND	0.130 J
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	ND	0.052 J
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWW-0 12/10/97	EBS28-PIPE-SS-15 12/10/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnapthalene	10,000	ND	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronapthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	0.053 J	0.230 J
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	ND	0.065 J
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	ND	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	ND	0.044 J
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	0.140 J	0.180 J
Anthracene	10,000	0.110 J	0.620
Di-n-butylphthalate	-	0.041 J	ND
Carbazole	-	ND	0.057 J
Fluoranthene	10,000	0.360 J	0.870
Pyrene	10,000	0.320 J	1.40
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	0.230 J	0.910
Chrysene	780	0.410 J	2.10
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	ND	0.078 J
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	0.630	2.90
Benzo(k)fluoranthene	78	0.160 J	1.10
Benzo(a)pyrene	0.8	0.360 J	1.80
Indeno(1,2,3-cd)pyrene	7.8	0.190 J	0.670

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWW-0 12/10/97	EBS28-PIPE-SS-15 12/10/97
Dibenzo(a,h)anthracene	0.8	0.064 J	0.240 J
Benzo(g,h,i)perylene	10,000	0.200 J	0.650

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmation Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SS-15 12/11/97	EBS28-PIPE-SWE-15 12/10/97
TPH (field screening)	-	250	256
TPH-IR (Method 418.1)	2,500*	41	40
TPH-GRO (Method 8015M)	2,500*	-	-
VOCs (Method 8260)			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	0.010	ND
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	ND	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	ND	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS23-PIPE-SS-15 12/17/97	EBS25-PIPE-SWE-15 12/10/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	ND	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	ND	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	ND	ND
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	ND	ND
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS25 PIPE SS-15 12/1/97	EBS28 PIPE SWE-15 12/10/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnaphthalene	10,000	ND	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronaphthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	ND	ND
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	ND	ND
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	ND	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	ND	ND
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	0.077 J	ND
Anthracene	10,000	ND	ND
Di-n-butylphthalate	-	ND	ND
Carbazole	-	ND	ND
Fluoranthene	10,000	ND	ND
Pyrene	10,000	ND	ND
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	ND	ND
Chrysene	780	ND	0.081 J
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	ND	ND
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	ND	0.090 J
Benzo(k)fluoranthene	78	ND	ND
Benzo(a)pyrene	0.8	ND	0.044 J
Indeno(1,2,3-cd)pyrene	7.8	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SS-15 12/17/97	EBS28-PIPE-SWE-15 12/10/97
Dibenzo(a,h)anthracene	0.8	ND	ND
Benzo(g,h,i)perylene	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS29-PIPE-SWW-15 12/10/97	EBS29-PIPE-SS-30 12/10/97
TPH (field screening)	-	152	530
TPH-IR (Method 418.1)	2,500*	69	430
TPH-GRO (Method 8015M)	2,500*	-	ND
VOCs (Method 8260)			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	0.016	ND
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	ND	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	ND	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

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Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWW-15 12/10/97	EBS28-PIPE-GS-30 12/10/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	ND	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	ND	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	ND	ND
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	ND	ND
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWW-15 12/10/97	EBS28-PIPE-GS-30 12/10/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnapthalene	10,000	ND	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronapthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	ND	ND
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	ND	ND
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	ND	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	ND	ND
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	ND	ND
Anthracene	10,000	ND	ND
Di-n-butylphthalate	-	ND	ND
Carbazole	-	ND	ND
Fluoranthene	10,000	ND	0.054 J
Pyrene	10,000	0.042 J	0.084 J
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	ND	ND
Chrysene	780	0.078 J	0.040 J
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	ND	ND
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	0.110 J	0.065 J
Benzo(k)fluoranthene	78	0.045 J	ND
Benzo(a)pyrene	0.8	0.049 J	0.050 J
Indeno(1,2,3-cd)pyrene	7.8	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28 PIPE-SWW-15 12/10/97	EBS28 PIPE-S3-30 12/10/97
Dibenzo(a,h)anthracene	0.8	ND	ND
Benzo(g,h,i)perylene	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWE-30 12/10/97	EBS28-PIPE-SWW-30 12/10/97
TPH (field screening)	-	590	728
TPH-IR (Method 418.1)	2,500*	130	110
TPH-GRO (Method 8015M)	2,500*	-	-
VOCs (Method 8260)			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	ND	ND
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	ND	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	ND	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWE-30	EBS28-PIPE-SWAV-30
		12/10/97	12/10/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	ND	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	ND	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	ND	ND
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	ND	ND
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWE-30 12/10/97	EBS28-PIPE-SWW-30 12/10/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnaphthalene	10,000	ND	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronaphthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	0.056 J	0.082 J
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	ND	ND
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	ND	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	ND	ND
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	ND	0.051 J
Anthracene	10,000	0.068 J	0.095 J
Di-n-butylphthalate	-	ND	ND
Carbazole	-	ND	ND
Fluoranthene	10,000	0.095 J	0.170 J
Pyrene	10,000	0.120 J	0.210 J
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	0.059 J	0.120 J
Chrysene	780	0.110 J	0.210 J
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	ND	0.086 J
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	0.240 J	0.440
Benzo(k)fluoranthene	78	0.078 J	0.160 J
Benzo(a)pyrene	0.8	0.120 J	0.200 J
Indeno(1,2,3-cd)pyrene	7.8	0.140 J	0.220 J

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWE-30 12/10/97	EBS28-PIPE-SWW-30 12/10/97
Dibenzo(a,h)anthracene	0.8	0.041 J	0.072 J
Benzo(g,h,i)perylene	10,000	0.160 J	0.220 J

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28 PIPE SS-45 12/10/97	EBS28 PIPE SWE-45 12/10/97
TPH (field screening)	-	618	546
TPH-IR (Method 418.1)	2,500*	400	110
TPH-GRO (Method 8015M)	2,500*	-	-
VOCs (Method 8260)			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	ND	ND
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	ND	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	ND	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SS-45 12/10/97	EBS28-PIPE-SWE-45 12/10/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	ND	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	ND	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	ND	ND
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	0.480	ND
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	0.110 J	ND
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

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Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-S5-45 12/10/97	EBS28-PIPE-SWE-45 12/10/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnapthalene	10,000	0.056 J	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronapthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	ND	ND
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	0.075 J	ND
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	0.079 J	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	0.071 J	ND
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	1.10	ND
Anthracene	10,000	0.100 J	ND
Di-n-butylphthalate	-	ND	ND
Carbazole	-	0.100 J	ND
Fluoranthene	10,000	1.30	ND
Pyrene	10,000	1.50	0.049 J
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	0.280 J	ND
Chrysene	780	0.790	0.063 J
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	ND	ND
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	1.10	0.099 J
Benzo(k)fluoranthene	78	0.580	ND
Benzo(a)pyrene	0.8	0.620	0.038 J
Indeno(1,2,3-cd)pyrene	7.8	0.250 J	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SS-45 12/10/97	EBS28-PIPE-SWE-45 12/10/97
Dibenzo(a,h)anthracene	0.8	0.072 J	ND
Benzo(g,h,i)perylene	10,000	0.250 J	0.041 J

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWW-45 12/10/97	EBS28-PIPE-SS-60 12/10/97
TPH (field screening)	-	576	550
TPH-IR (Method 418.1)	2,500*	170	620
TPH-GRO (Method 8015M)	2,500*	-	-
VOCs (Method 8260)			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	ND	0.017
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	ND	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	ND	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWW-45 12/10/97	EBS28-PIPE-SS-60 12/10/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	ND	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	ND	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	ND	ND
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	ND	0.380 J
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	ND	ND
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria	EBS28-PIPE-SWW-45	EBS28-PIPE-SS-60
	Industrial/Commercial	12/10/97	12/10/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnaphthalene	10,000	ND	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronaphthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	ND	ND
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	ND	ND
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	ND	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	ND	ND
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	ND	0.044 J
Anthracene	10,000	ND	ND
Di-n-butylphthalate	-	ND	ND
Carbazole	-	ND	ND
Fluoranthene	10,000	ND	0.070 J
Pyrene	10,000	ND	0.160 J
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	ND	0.058 J
Chrysene	780	ND	0.120 J
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	ND	0.100 J
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	0.042 J	0.170 J
Benzo(k)fluoranthene	78	ND	0.067 J
Benzo(a)pyrene	0.8	ND	0.086 J
Indeno(1,2,3-cd)pyrene	7.8	ND	0.048 J

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWW-45 12/10/97	EBS28-PIPE-SS-60 12/10/97
Dibenzo(a,h)anthracene	0.8	ND	ND
Benzo(g,h,i)perylene	10,000	ND	0.054 J

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWE-60 12/10/97	EBS28-PIPE-SWW-60 12/10/97
TPH (field screening)	-	248	340
TPH-IR (Method 418.1)	2,500*	78	160
TPH-GRO (Method 8015M)	2,500*	-	-
VOCs (Method 8260)			
Dichlorodifluoromethane	-	ND	ND
Chloromethane	-	ND	ND
Vinyl chloride	3.0	ND	ND
Bromomethane	2,900	ND	ND
Chloroethane	-	ND	ND
Trichlorofluoromethane	-	ND	ND
1,1-Dichloroethene	9.5	ND	ND
Carbon disulfide	-	ND	ND
Iodomethane	-	ND	ND
Acetone	10,000	ND	0.008
Methylene chloride	760	ND	ND
trans-1,2-Dichloroethene	10,000	ND	ND
1,1-Dichloroethane	10,000	ND	ND
Vinyl acetate	-	ND	ND
2,2-Dichloropropane	-	ND	ND
cis-1,2-Dichloroethene	10,000	ND	ND
Methyl ethyl ketone	10,000	ND	ND
Bromochloromethane	-	ND	ND
Chloroform	940	ND	ND
1,1,1-Trichloroethane	10,000	ND	ND
Carbon tetrachloride	44	ND	ND
1,1-Dichloropropene	-	ND	ND
Benzene	200	ND	ND
1,2-Dichloroethane	63	ND	ND
Trichloroethene	520	ND	ND
1,2-Dichloropropane	84	ND	ND
Dibromomethane	-	ND	ND
Bromodichloromethane	92	ND	ND
2-Chloroethyl vinyl ether	-	ND	ND
cis-1,3-Dichloropropene	-	ND	ND
4-Methyl-2-pentanone	10,000	ND	ND
Toluene	10,000	ND	ND
trans-1,3-Dichloropropene	-	ND	ND
1,1,2-Trichloroethane	100	ND	ND
Tetrachloroethene	110	ND	ND
1,3-Dichloropropane	-	ND	ND
2-Hexanone	-	ND	ND
Dibromochloromethane	68	ND	ND
1,2-Dibromoethane	0.07	ND	ND
Chlorobenzene	10,000	ND	ND
1,1,1,2-Tetrachloroethane	220	ND	ND
Ethylbenzene	10,000	ND	ND
Xylenes (total)	10,000	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWE-60 12/10/97	EBS28-PIPE-SWW-60 12/10/97
Styrene	190	ND	ND
Bromoform	720	ND	ND
Isopropylbenzene	10,000	ND	ND
Bromobenzene	-	ND	ND
1,1,2,2-Tetrachloroethane	29	ND	ND
1,2,3-Trichloropropane	-	ND	ND
n-Propylbenzene	-	ND	ND
2-Chlorotoluene	-	ND	ND
4-Chlorotoluene	-	ND	ND
1,3,5-Trimethylbenzene	-	ND	ND
tert-Butylbenzene	-	ND	ND
1,2,4-Trimethylbenzene	-	ND	ND
sec-Butylbenzene	-	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
4-Isopropyltoluene	-	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
n-Butylbenzene	-	ND	ND
1,2-Dibromo-3-chloropropane	4.1	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Hexachlorobutadiene	-	ND	ND
1,2,3-Trichlorobenzene	-	ND	ND
Methyl-t-Butyl Ether	10,000	ND	ND
Napthalene	10,000	ND	ND
SVOCs (Method 8270)			
Phenol	10,000	ND	ND
bis(2-Chloroethyl)ether	5.2	ND	ND
2-Chlorophenol	10,000	ND	ND
1,3-Dichlorobenzene	10,000	ND	ND
1,4-Dichlorobenzene	240	ND	ND
1,2-Dichlorobenzene	10,000	ND	ND
2-Methylphenol	-	ND	ND
2,2'-oxybis(1-Chloropropane)	82	ND	ND
4-Methylphenol	-	ND	ND
n-Nitroso-di-n-propylamine	-	ND	ND
Hexachloroethane	410	ND	ND
Nitrobenzene	-	ND	ND
Isophorone	-	ND	ND
2-Nitrophenol	-	ND	ND
2,4-Dimethylphenol	10,000	ND	ND
bis(2-Chloroethoxy)methane	-	ND	ND
2,4-Dichlorophenol	6,100	ND	ND
1,2,4-Trichlorobenzene	10,000	ND	ND
Napthalene	10,000	ND	ND
4-Chloroaniline	8,200	ND	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PIPE-SWE-60 12/10/97	EBS28-PIPE-SWAV-60 12/10/97
Hexachlorobutadiene	73	ND	ND
4-Chloro-3-methylphenol	-	ND	ND
2-Methylnapthalene	10,000	ND	ND
Hexachlorocyclopentadiene	-	ND	ND
2,4,6-Trichlorophenol	520	ND	ND
2,4,5-Trichlorophenol	10,000	ND	ND
2-Chloronapthalene	-	ND	ND
2-Nitroaniline	-	ND	ND
Dimethylphthalate	10,000	ND	ND
Acenaphthylene	10,000	ND	ND
2,6-Dinitrotoluene	-	ND	ND
3-Nitroaniline	-	ND	ND
Acenaphthene	10,000	ND	ND
2,4-Dinitrophenol	4,100	ND	ND
4-Nitrophenol	-	ND	ND
Dibenzofuran	-	ND	ND
2,4-Dinitrotoluene	8.4	ND	ND
Diethylphthalate	10,000	ND	ND
Fluorene	10,000	ND	ND
4-Chlorophenyl-phenylether	-	ND	ND
4-Nitroaniline	-	ND	ND
4,6-Dinitro-2-methylphenol	-	ND	ND
n-Nitrosodiphenylamine	-	ND	ND
4-Bromophenyl-phenylether	-	ND	ND
Hexachlorobenzene	3.6	ND	ND
Pentachlorophenol	48	ND	ND
Phenanthrene	10,000	ND	ND
Anthracene	10,000	ND	ND
Di-n-butylphthalate	-	ND	ND
Carbazole	-	ND	ND
Fluoranthene	10,000	ND	0.052 J
Pyrene	10,000	ND	0.052 J
Butylbenzylphthalate	-	ND	ND
Benzo(a)anthracene	7.8	ND	0.039 J
Chrysene	780	0.084 J	0.075 J
3,3'-Dichlorobenzidine	13	ND	ND
bis(2-Ethylhexyl)phthalate	410	ND	ND
Di-n-octylphthalate	-	ND	ND
Benzo(b)fluoranthene	7.8	0.140 J	0.110 J
Benzo(k)fluoranthene	78	0.054 J	0.042 J
Benzo(a)pyrene	0.8	0.074 J	0.046 J
Indeno(1,2,3-cd)pyrene	7.8	0.049 J	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
Piping Excavation Confirmatory Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28 PIPE-SWE-60 12/10/97	EBS28 PIPE-SWAV-60 12/10/97
Dibenzo(a,h)anthracene	0.8	ND	ND
Benzo(g,h,i)perylene	10,000	0.051 J	ND

* This value is based on total TPH which is considered the sum of TPH-IR and TPH-GRO

EBS Review Item 28
EPA-Requested Piping Excavation Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS26-PIPE-SS-0 12/30/97
<i>TCL PEST/PCBs (Method 8080)</i>		
alpha-BHC	-	ND
gamma-BHC	-	ND
Heptachlor	-	ND
Aldrin	-	ND
beta-BHC	-	ND
delta-BHC	-	ND
Heptachlor epoxide	-	ND
Endosulfan I	-	ND
4,4'-DDE	-	ND
Dieldrin	0.4	ND
Endrin	-	ND
4,4'-DDD	-	ND
Endosulfan II	-	ND
4,4'-DDT	-	ND
Endrin aldehyde	-	ND
Methoxychlor	-	ND
Endosulfan sulfate	-	ND
Chlordane (technical)	4.4	ND
Toxaphene	-	ND
PCBs (total)	10	ND
<i>TAL Metals (Method 6010,7000)</i>		
Aluminum	-	4,300
Antimony	820	ND
Arsenic	3.8	2
Barium	10,000	29
Beryllium	1.3	0.3
Cadmium	1,000	ND
Calcium	-	500
Chromium	10,000	7
Cobalt	-	4
Copper	10,000	18
Iron	-	11,000
Lead	500	55
Magnesium	-	1,700
Manganese	10,000	130
Mercury	610	ND
Nickel	10,000	7.5
Potassium	-	740
Selenium	10,000	ND
Silver	10,000	ND
Sodium	-	ND
Thallium	140	ND

EBS Review Item 28
EPA-Requested Piping Excavation Sample Results

ANALYTICAL PARAMETER (ppm)	Direct Exposure Criteria Industrial/Commercial	EBS28-PBPE-SS-0 12/30/97
Vanadium	10,000	10
Zinc	10,000	78

EBS Review Item 28
Septic Tanks Waste Characterization Sample Results

ANALYTICAL PARAMETER	DV-EBS28-ST* 12/16/97	DV-EBS28-ST2** 1/13/98
TPH-IR (Method 418.1), ppm	ND	840
Flashpoint (Method 1010), deg. F	>155	>170
pH, S.U.	6.2	6.2
Reactive Cyanide, ppm	ND	ND
Reactive Sulfides, ppm	ND	98
<i>VOCs (Method 8240 or 8260), ppm</i>		
Dichlorodifluoromethane	ND	-
Chloromethane	ND	ND
Vinyl chloride	ND	ND
Bromomethane	ND	0.009
Chloroethane	ND	ND
Trichlorofluoromethane	ND	-
1,1-Dichloroethene	ND	ND
Carbon disulfide	ND	ND
Iodomethane	ND	-
Acetone	ND	0.037
Methylene chloride	ND	ND
trans-1,2-Dichloroethene	ND	ND
1,1-Dichloroethane	ND	ND
Vinyl acetate	ND	-
2,2-Dichloropropane	ND	-
cis-1,2-Dichloroethene	ND	ND
Methyl ethyl ketone	ND	ND
Bromochloromethane	ND	-
Chloroform	ND	ND
1,1,1-Trichloroethane	ND	ND
Carbon tetrachloride	ND	ND
1,1-Dichloropropene	ND	-
Benzene	ND	ND
1,2-Dichloroethane	ND	ND
Trichloroethene	ND	ND
1,2-Dichloropropane	ND	ND
Dibromomethane	ND	-
Bromodichloromethane	ND	ND
2-Chloroethyl vinyl ether	ND	-
cis-1,3-Dichloropropene	ND	ND
4-Methyl-2-pentanone	ND	ND
Toluene	0.040	ND
trans-1,3-Dichloropropene	ND	ND
1,1,2-Trichloroethane	ND	ND
Tetrachloroethene	ND	ND
1,3-Dichloropropane	ND	-
2-Hexanone	ND	ND
Dibromochloromethane	ND	ND
1,2-Dibromoethane	ND	-
Chlorobenzene	0.220	0.460
1,1,1,2-Tetrachloroethane	ND	-

EBS Review Item 28
Septic Tanks Waste Characterization Sample Results

ANALYTICAL PARAMETER	DV-EBS28-ST* 12/16/97	DV-EBS28-ST2** 1/13/98
Ethylbenzene	ND	ND
Xylenes (total)	0.064	0.010
Styrene	ND	ND
Bromoform	ND	ND
Isopropylbenzene	ND	-
Bromobenzene	ND	-
1,1,2,2-Tetrachloroethane	ND	ND
1,2,3-Trichloropropane	ND	-
n-Propylbenzene	ND	-
2-Chlorotoluene	ND	-
4-Chlorotoluene	ND	-
1,3,5-Trimethylbenzene	0.017	-
tert-Butylbenzene	ND	-
1,2,4-Trimethylbenzene	0.060	-
sec-Butylbenzene	ND	-
1,3-Dichlorobenzene	0.062	-
4-Isopropyltoluene	ND	-
1,4-Dichlorobenzene	0.060	-
1,2-Dichlorobenzene	ND	-
n-Butylbenzene	ND	-
1,2-Dibromo-3-chloropropane	ND	-
1,2,4-Trichlorobenzene	ND	-
Hexachlorobutadiene	ND	-
1,2,3-Trichlorobenzene	ND	-
Methyl-t-Butyl Ether	ND	-
Napthalene	0.021	-
<i>SVOCs (Method 8270), ppm</i>		
Phenol	ND	ND
bis(2-Chloroethyl)ether	ND	ND
2-Chlorophenol	ND	ND
1,3-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	0.039	0.650 J
1,2-Dichlorobenzene	ND	ND
2-Methylphenol	ND	ND
2,2'-oxybis(1-Chloropropane)	ND	ND
4-Methylphenol	ND	ND
n-Nitroso-di-n-propylamine	ND	ND
Hexachloroethane	ND	ND
Nitrobenzene	ND	ND
Isophorone	ND	ND
2-Nitrophenol	ND	ND
2,4-Dimethylphenol	ND	ND
bis(2-Chloroethoxy)methane	ND	ND
2,4-Dichlorophenol	ND	ND
1,2,4-Trichlorobenzene	ND	ND

EBS Revi w Item 28
Septic Tanks Waste Characterization Sample Results

ANALYTICAL PARAMETER	DV-EBS28-ST1 12/16/97	DV-EBS28-ST2** 1/13/98
Napthalene	0.014	ND
4-Chloroaniline	ND	ND
Hexachlorobutadiene	ND	ND
4-Chloro-3-methylphenol	ND	ND
2-Methylnapthalene	0.013	0.170 J
Hexachlorocyclopentadiene	ND	ND
2,4,6-Trichlorophenol	ND	ND
2,4,5-Trichlorophenol	ND	ND
2-Chloronapthalene	ND	ND
2-Nitroaniline	ND	ND
Dimethylphthalate	ND	ND
Acenaphthylene	ND	ND
2,6-Dinitrotoluene	ND	ND
3-Nitroaniline	ND	ND
Acenaphthene	0.002 J	ND
2,4-Dinitrophenol	ND	ND
4-Nitrophenol	ND	ND
Dibenzofuran	ND	ND
2,4-Dinitrotoluene	ND	ND
Diethylphthalate	ND	ND
Fluorene	0.002 J	0.440 J
4-Chlorophenyl-phenylether	ND	ND
4-Nitroaniline	ND	ND
4,6-Dinitro-2-methylphenol	ND	ND
n-Nitrosodiphenylamine	ND	ND
4-Bromophenyl-phenylether	ND	ND
Hexachlorobenzene	ND	ND
Pentachlorophenol	ND	ND
Phenanthrene	0.003 J	1.50
Anthracene	ND	0.620 J
Di-n-butylphthalate	ND	ND
Carbazole	ND	ND
Fluoranthene	ND	4.00
Pyrene	ND	3.50
Butylbenzylphthalate	ND	ND
Benzo(a)anthracene	ND	1.30
Chrysene	ND	1.60
3,3'-Dichlorobenzidine	ND	ND
bis(2-Ethylhexyl)phthalate	ND	0.570 J
Di-n-octylphthalate	ND	ND
Benzo(b)fluoranthene	ND	1.50
Benzo(k)fluoranthene	ND	0.620 J

EBS Review Item 28
Septic Tanks Waste Characterization Sample Results

ANALYTICAL PARAMETER	DV-EBS28-ST1 12/16/97	DV-EBS28-ST2** 1/13/98
Benzo(a)pyrene	ND	0.850 J
Indeno(1,2,3-cd)pyrene	ND	0.230 J
Dibenzo(a,h)anthracene	ND	ND
Benzo(g,h,i)perylene	ND	0.240 J
<i>PEST/PCBs (Method 8080), ppm</i>		
alpha-BHC	ND	ND
gamma-BHC	ND	ND
Heptachlor	ND	ND
Aldrin	ND	ND
beta-BHC	ND	ND
delta-BHC	ND	ND
Heptachlor epoxide	ND	ND
Endosulfan I	ND	ND
4,4'-DDE	ND	ND
Dieldrin	ND	ND
Endrin	ND	ND
4,4'-DDD	ND	ND
Endosulfan II	ND	ND
4,4'-DDT	ND	ND
Endrin aldehyde	ND	ND
Methoxychlor	ND	ND
Endosulfan sulfate	ND	ND
Endrin ketone	-	ND
Chlordane	ND	ND
alpha-Chlordane	-	ND
gamma-Chlordane	-	ND
Toxaphene	ND	ND
Aroclor-1016	ND	ND
Aroclor-1221	ND	ND
Aroclor-1232	ND	ND
Aroclor-1242	ND	ND
Aroclor-1248	ND	ND
Aroclor-1254	ND	ND
Aroclor-1260	ND	ND
<i>Total Metals (Method 6010,7000), ppm</i>		
Aluminum	-	6,100
Antimony	-	ND
Arsenic	ND	3
Barium	0.01	61
Beryllium	-	0.4
Cadmium	ND	ND
Calcium	-	960

EBS Review Item 28
Septic Tanks Waste Characterization Sample Results

ANALYTICAL PARAMETER	DV-EBS28-ST* 12/16/97	DV-EBS28-ST2** 1/13/98
Chromium	ND	15
Cobalt	-	5
Copper	-	33
Iron	-	20,000
Lead	ND	35
Magnesium	-	1,400
Manganese	-	240
Mercury	ND	ND
Nickel	-	14
Potassium	-	840
Selenium	ND	ND
Silver	ND	ND
Sodium	-	ND
Thallium	-	ND
Vanadium	-	14
Zinc	-	360

* Aqueous waste.

** Septic tank solids.

EBS Review Item 28
Soil Waste Characterization Sample Results

ANALYTICAL PARAMETER	EBS28-WC-1 12/12/97	EBS28-WC-2 12/15/97	EBS28-WC-3 12/15/97	EBS28-WC-4 12/15/97
TPH-IR (Method 418.1), ppm	140	3,100	180	470
Flashpoint (Method 1010), deg. F	>150	-	-	-
pH, S.U.	6.7	-	-	-
Reactive Cyanide, ppm	ND	-	-	-
Reactive Sulfides, ppm	ND	-	-	-
<i>VOCs (Method 8240), ppm</i>				
Chloromethane	ND	-	-	-
Vinyl chloride	ND	-	-	-
Bromomethane	ND	-	-	-
Chloroethane	ND	-	-	-
1,1-Dichloroethene	ND	-	-	-
Acetone	0.018	-	-	-
Carbon disulfide	ND	-	-	-
Methylene chloride	0.012	-	-	-
trans-1,2-Dichloroethene	ND	-	-	-
1,1-Dichloroethane	ND	-	-	-
2-Butanone	ND	-	-	-
cis-1,2-Dichloroethene	ND	-	-	-
Chloroform	ND	-	-	-
1,1,1-Trichloroethane	ND	-	-	-
Carbon tetrachloride	ND	-	-	-
1,2-Dichloroethane	ND	-	-	-
Benzene	ND	-	-	-
Trichloroethene	ND	-	-	-
1,2-Dichloropropane	ND	-	-	-
Bromodichloromethane	ND	-	-	-
cis-1,3-Dichloropropene	ND	-	-	-
4-Methyl-2-pentanone	ND	-	-	-
Toluene	ND	-	-	-
trans-1,3-Dichloropropene	ND	-	-	-
1,1,2-Trichloroethane	ND	-	-	-
Tetrachloroethene	ND	-	-	-
2-Hexanone	ND	-	-	-
Dibromochloromethane	ND	-	-	-
Chlorobenzene	ND	-	-	-
Ethylbenzene	ND	-	-	-
Xylenes (total)	ND	-	-	-
Styrene	ND	-	-	-
Bromoform	ND	-	-	-
1,1,1,2-Tetrachloroethane	ND	-	-	-
<i>SVOCs (Method 8270), ppm</i>				
Phenol	ND	-	-	-
bis(2-Chloroethyl)ether	ND	-	-	-
2-Chlorophenol	ND	-	-	-
1,3-Dichlorobenzene	ND	-	-	-
1,4-Dichlorobenzene	ND	-	-	-

EBS Review Item 28
Soil Waste Characterization Sample Results

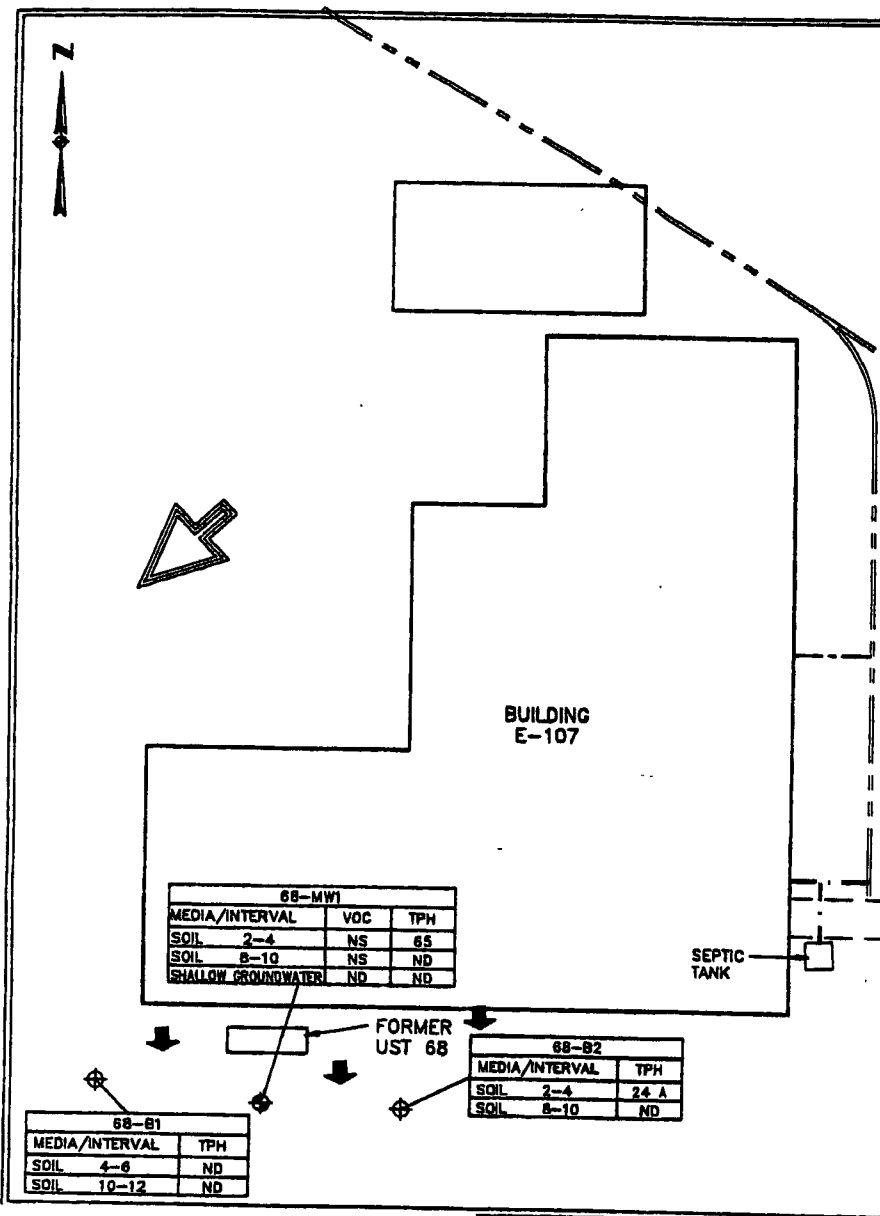
ANALYTICAL PARAMETER	EBS28-WC-1 12/12/97	EBS28-WC-2 12/15/97	EBS28-WC-3 12/15/97	EBS28-WC-4 12/15/97
1,2-Dichlorobenzene	ND	-	-	-
2-Methylphenol	ND	-	-	-
2,2'-oxybis(1-Chloropropane)	ND	-	-	-
4-Methylphenol	ND	-	-	-
n-Nitroso-di-n-propylamine	ND	-	-	-
Hexachloroethane	ND	-	-	-
Nitrobenzene	ND	-	-	-
Isophorone	ND	-	-	-
2-Nitrophenol	ND	-	-	-
2,4-Dimethylphenol	ND	-	-	-
bis(2-Chloroethoxy)methane	ND	-	-	-
2,4-Dichlorophenol	ND	-	-	-
1,2,4-Trichlorobenzene	ND	-	-	-
Napthalene	ND	-	-	-
4-Chloroaniline	ND	-	-	-
Hexachlorobutadiene	ND	-	-	-
4-Chloro-3-methylphenol	ND	-	-	-
2-Methylnapthalene	ND	-	-	-
Hexachlorocyclopentadiene	ND	-	-	-
2,4,6-Trichlorophenol	ND	-	-	-
2,4,5-Trichlorophenol	ND	-	-	-
2-Chloronapthalene	ND	-	-	-
2-Nitroaniline	ND	-	-	-
Dimethylphthalate	ND	-	-	-
Acenaphthylene	ND	-	-	-
2,6-Dinitrotoluene	ND	-	-	-
3-Nitroaniline	ND	-	-	-
Acenaphthene	ND	-	-	-
2,4-Dinitrophenol	ND	-	-	-
4-Nitrophenol	ND	-	-	-
Dibenzofuran	ND	-	-	-
2,4-Dinitrotoluene	ND	-	-	-
Diethylphthalate	ND	-	-	-
Fluorene	ND	-	-	-
4-Chlorophenyl-phenylether	ND	-	-	-
4-Nitroaniline	ND	-	-	-
4,6-Dinitro-2-methylphenol	ND	-	-	-
n-Nitrosodiphenylamine	ND	-	-	-
4-Bromophenyl-phenylether	ND	-	-	-
Hexachlorobenzene	ND	-	-	-
Pentachlorophenol	ND	-	-	-
Phenanthrene	0.086 J	-	-	-

EBS Review Item 28
Soil Waste Characterization Sample Results

ANALYTICAL PARAMETER	EBS28-WC-1 12/12/97	EBS28-WC-2 12/15/97	EBS28-WC-3 12/15/97	EBS28-WC-4 12/15/97
Anthracene	ND	-	-	-
Di-n-butylphthalate	ND	-	-	-
Carbazole	ND	-	-	-
Fluoranthene	0.150 J	-	-	-
Pyrene	0.110 J	-	-	-
Butylbenzylphthalate	ND	-	-	-
Benzo(a)anthracene	0.089 J	-	-	-
Chrysene	0.100 J	-	-	-
3,3'-Dichlorobenzidine	ND	-	-	-
bis(2-Ethylhexyl)phthalate	ND	-	-	-
Di-n-octylphthalate	ND	-	-	-
Benzo(b)fluoranthene	0.140 J	-	-	-
Benzo(k)fluoranthene	0.062 J	-	-	-
Benzo(a)pyrene	0.088 J	-	-	-
Indeno(1,2,3-cd)pyrene	ND	-	-	-
Dibenzo(a,h)anthracene	ND	-	-	-
Benzo(g,h,i)perylene	ND	-	-	-
<i>PCBs (Method 8080), ppm</i>				
Aroclor-1016	ND	-	-	-
Aroclor-1221	ND	-	-	-
Aroclor-1232	ND	-	-	-
Aroclor-1242	ND	-	-	-
Aroclor-1248	ND	-	-	-
Aroclor-1254	ND	-	-	-
Aroclor-1260	ND	-	-	-
<i>RCRA 8 Metals (Method 6010,7000), ppm</i>				
Arsenic	2	-	-	-
Barium	22	-	-	-
Cadmium	ND	-	-	-
Chromium	5	-	-	-
Lead	19	-	-	-
Mercury	ND	-	-	-
Selenium	ND	-	-	-
Silver	ND	-	-	-
<i>TCLP Metals (Method 1311/6010), mg/L</i>				
Lead	0.02	-	-	-

Appendix A-3

**UST Remedial Investigation Report, December 1994
UST Location 68, Area E (Review Item 85)
Figures, Boring Logs, and Analytical Data Summary Tables**



LEGEND

SURFACE GRADE
 ESTIMATED DIRECTION OF GROUNDWATER FLOW (SEE TEXT)

TPH - TOTAL PETROLEUM HYDROCARBONS
 VOC - TOTAL VOLATILE ORGANIC COMPOUNDS BY LABORATORY ANALYSIS
 NS - NO SAMPLE COLLECTED
 ND - NONE DETECTED
 A - AVERAGE OF DUPLICATE SAMPLES

All analytical results are expressed in parts per million (ppm).
 Sample intervals are expressed in below ground surface.

MW# - MONITORING WELL
 B# - SOIL BORING
 -BROKEN LINES INDICATE UNDERGROUND UTILITIES

Redrawn from US Naval Advance Base Depot, Davisville, RI. Subsurface Utilities Map revised June, 1992.
 Location of former UST piping unknown.

FIGURE 4-16
MAP AND ANALYTICAL RESULTS
UST LOCATION 68
FORMER NCBC DAVISVILLE, RI

CLIENT:	U.S. NAVY	CONTRACT No.:	N62472-90-D-1298 (CLEAN)
SCALE:	1" = 20'	DATE:	DECEMBER 1994
DRAWING No.:		AC FILE No.:	C:\BNS\DAVISVILLE\FIG 4-16.DWG
		REV:	0

SCALE
 0 20 40
 1 inch = 20 feet

BOTHING LOG

NEED CORRECTION

PROJECT: (TO 178 - YST) ^{log 1191} LOCATION: DAVISVILLE RE ORDERED BY: EDI - S. LaMarche BORING NO.: (68-MW-11)
 DATE STARTED: 7-11-94 INFORMATION: Vertical LOOSED BY: K. J. J. L. L. T. GAINED ELEV.: N.M.
 DATE COMPLETED: BEARING: N.M. CHECKED BY: TOTAL DEPTH: 20'

ELEV. Feet	DEPTH Feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE- NO.	BLOWS PER 6"	PEN. IN.	REC. IN.			
0								NO SAMPLES 0-2'
1								
2								
2		S-1	9-10 12-10	24	18	68-MW-1-SB-0304 1017 hrs 2000 ppm		S-1A (8in) SILTY SAND. Fine sand poorly graded; root matter. Brown (tan). (SM) S-1B (10in) SAND, ^{core} tr. silt ^{to gravel} Fine tr. med sand poorly graded; 1 piece fine subrounded gravel up to 1/2 in length. Grey-brown (SM)
4		S-2	2-2 2-2	24	15	68-MW-1-SB-0406 1018 hrs 4500 ppm		S-2A (10in) SAND, ^{core} tr. silt ^{to gravel} Similar to S-1B (SM)
6								
7		S-3	4-5 5-5	24	20	68-MW-1-SB-0608 1022 hrs 4000 ppm		S-3B (5in) SAND, tr. silt Fine sand poorly graded; stratified; reddish brown (SP)
8		S-4	4-5 7-7	24	24	68-MW-1-SB-0810 1025 hrs 4000 ppm		S-3A (9in) SAND ^{tr. gravel} tr. med sand ^{fine} poorly graded; 1 piece fine subrounded gravel up to 1/4 in length - grey brown (SM)
10		S-5	4-5 8-9	24	13	68-MW-1-SB-1012 1025 hrs 1500 ppm		S-3B (9in) SAND, tr. silt. ^{tr. gravel} Fin sand + coarse sand, poorly graded; 1 piece fine subrounded gravel. Brown (SP) up to 1/4 in length
12		S-6	12-9 14-14	24	24	68-MW-1-SB-1214 1040 hrs 1000 ppm		S-3C (7in) SAND tr. silt Fine sand poorly graded light grey-brown (SP)
14		S-7	18-21 23-23	24	20	68-MW-1-SB-1416 1053 hrs 7000 ppm		S-4A (2 1/2 in) SAND tr. silt Fin sand poorly graded Brown (SP)
16		S-8	11-7 16-7	24	24	68-MW-1-SB-1618 1057 hrs 1500 ppm		S-4B (17in) SAND tr. silt Fine sand grey brown poorly graded (SP)
18		S-9	4-5 7-9	24	20	68-MW-1-SB-1820 1100 hrs 3000 ppm		
19								
20								

LEGEND:

TYPE-NO - Type of sample

C - Rock core sample

S - Soil sample

BLOWS PER 6" - 40 lb. hammer

1 inch 30" to 40"

1 inch 30" to 40"

CORRECTION TO 100% OF 100%

PEN - Penetration test

REC - (Length of sample)

E - Notes on ground water

NOTES:

HSA 4 1/4" ID 8' OD
 Continuous soil sampling 2'-20'
 2' increments 2" ID
 SPECIM

K. J. J. L. L. T.
 Hand Space
 Technique

DATE: 7-15-94 PROJECT NO.: 1905
 PAGE: 1 OF 2 BORING NO.: 68-MW-11

BORING LOG

MINI-CORRECTION

PROJECT: CTD 128 LOCATION: Duille RI ORDERED BY: LDI-S. L. L. A. IN BORING NO. 105-111
 DATE STARTED: 7-11-94 INCLINATION: vertical LOSSER BY: K. Walker GRAINER BY: N/A
 DATE COMPLETED: BEARING: 11m CHECKED BY: TOTAL DEPTH: 20'

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE- NO.	BLOWS PER 6"	PEN. in	REC. in			
								S-5 (16 in.) SAND, some silt. Fine sand poorly graded. Stratified Grey-brown (SM)
								S-6 (24 in.) SILTY SAND. Fine sand. poorly graded; stratified/bedded brown interbeds of silt (1" thick) (SM)
								S-7 (10 in.) SAND tr. silt. FINE SAND poorly graded Brown (SP)
								S-7A (10 in.) Gravelly silty sand. FINE tr. coarse sand. coarse subrounded gravel up to 1 in. in length. fine subrounded gravel up to 1/2" in length. Greyish brown (GM).
								S-8 (24 in.) Gravelly silty sand - similar to S-7B (GM) Interbed of silty fine sand - 4 in thick grey/black (GM-SM)
								S-9 (20 in.) SAND tr. silt. Fine sand tr. red sand poorly graded. interbed of silty fine sand (SM) Red mottling at base of split barrel (SP-SM)

EOB at 20'. Augers to 20'
 Set well at 10.5-11.5
 See well log. 10-4
 Sand shown 10.5-11.5
 10.5-10

LEGEND:

TYPE-NO. - Type of sample
 C - Rock core sample
 E - Split barrel sample
 BLOWS PER 6" - 40 lb. hammer
 "slung 30" to drive
 1 foot batter sample:
 boring tube not lost at rock
 PEN - Penetration depth of sampler
 REC - Length of sample recovered
 Z - Number of blows water table

NOTES:

See page 1
 HSA 4 1/4" ID 8" OD

backfill w/ bent pipe
 + sand to 10.5

DATE: 7-11-94 PROJECT NO:
 PAGE: 2 OF 2 BORING NO.:

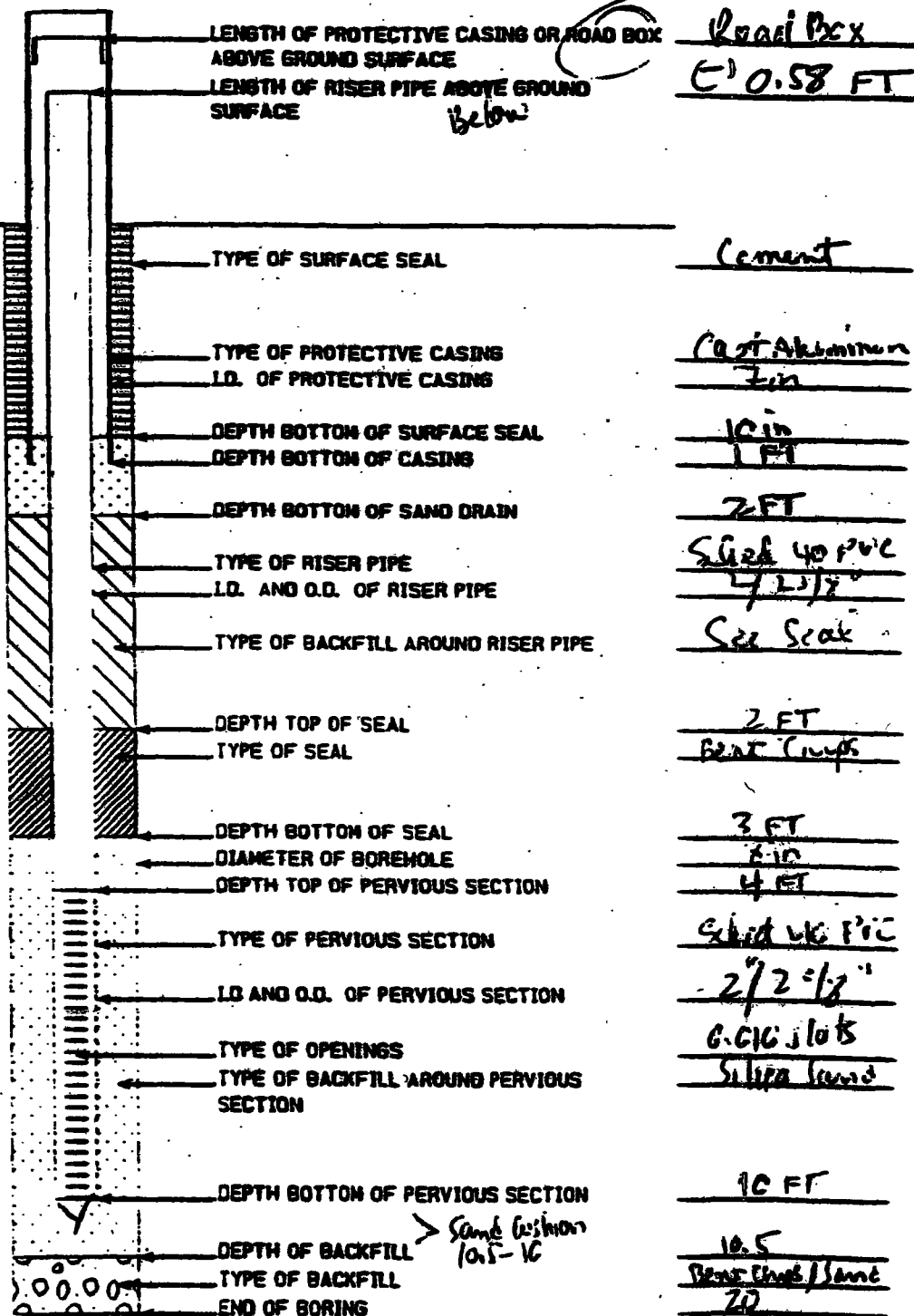
OVERBURDEN WELL CONSTRUCTION LOG

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

PROJECT: CTO 178 CST Investigation PAGE: 1 OF 1
 PROJECT LOCATION: DAVISVILLE RT
 CLIENT: NAVFAC LENO CORP BORING NO.: WH-68-MWI
 CONTRACTOR: E-DI DRILLER: S. L. LAROCK BORING LOCATION: CST 178 Area E
 LOGGED BY: K. J. KURT DATE: 7-11-94 PROJECT NO.: 1905, CTO 178
 CHECKED BY: DATE:

ELEVATION TOP OF PROTECTIVE CASING NMELEVATION TOP OF RISER PIPE NMGROUND ELEVATION NMGeneral
soil
conditions
(not
to
scale)material
not
disturbed

1 centimeter



BORING LOG

PROJECT: CTR 172 LOCATION: D'VILLE, ILL. COLLECTED BY: EDI - S. L. Kalkreuth BORING NO.: 60
 DATE STARTED: 7-11-94 INCLINATION: VERTICAL LOGGED BY: K. Jalkut GROUND ELEV.: 700.1
 DATE COMPLETED: 7-11-94 BEARING: N.M. CHECKED BY: TOTAL DEPTH: 12'

ELEV. feet	DEPTH feet	SAMPLE				REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		TYPE-NO.	BLOWS PER 6" L.	PEN. L.	REC. L.			
0								NO SAMPLES 0-2'
1								
2								
3		S-1	4-6	24	24	68-B1-SB-0204 150 0247 hrc 10m		S-1 (24in) SAND tr. silt. Fine sand, tr. red sand, poorly graded; root matter. Grey-brown. (SP)
4								
5		S-2	4-6	24	14	68-B1-SB-0406 120 0855 hrc 20m		S-2 (24in) Similar to S-1 (SP) wet.
6								
7		S-3	4-6	24	17	68-B1-SB-0608 150 0905 hrc 50m		S-3 (24in) SAND, tr. silt. Fine sand tr. red sand poorly graded. Brown. wet (SP)
8								
9		S-4	4-10	24	14	68-B1-SB-0810 150 0920 hrc 60m		S-4 (17in) SAND tr. silt. Fine sand tr. red sand poorly graded. A few pieces fine subrounded gravel up to 1/4" in length. Reddish brown mottling at 12-14" (2" thick). Grey brown. (SP)
10								
11		S-5	4-7	24	17	68-B1-SB-1012 150 0935 hrc 60m		S-5 (14) SAND tr. silt. Fine sand tr. red sand poorly graded. Grey-brown / mottled w/ grey silt and fine gravel. 2" thick. Brown fine sand w/ light mottling of silt (SP-SM)
12								
13		S-6						
14								
15		S-7						
16								
17		S-8						S-8 A (16in) SAND tr. silt, tr. gravel. Fine to red sand poorly graded, coarse gravel up to 1/4" - subrounded grey-brown (SP) tr. gravel
18								
19		S-9						S-9 B (7in) SAND tr. silt F.S. (sand well graded, fine subrounded gravel up to 1/4" in length (SM) Rat m. n.
20								

LEGEND:
 TYPE-40 - 1/2" dia. sampler
 C - 1/2" dia. sampler
 E - 1/2" dia. sampler
 BLOWS PER 6" - 40 B. sampler
 (using 30" to 40" dia. sampler)
 1 inch 30" to 40" dia. sampler
 PEN - Penetration test at 100 lb
 CORING TIME - 100 lb force
 REC - Length of sample recovered
 L - Number of blows used to core

NOTES:

HSA 4 1/4" ID 8" O.D.
 Continuous soil sampling 2' to
 w/ 2" sampler 2" ID
 k. Handpiece for sample

WELL NO. 12, Borehole
 w/ heavy string
 sand to 2', same to

DATE: 7-11-94 PROJECT NO.:
 PAGE: 1 OF 1 BORING NO.: 60

BORING LOG

NEED CORRECTIONS

PROJECT: CTO 122-117 LOCATION: D'ville, KY DRIED BY: E.D. - C. A. Mack BORING NO.: 68-150
 DATE STARTED: 7-11-94 INCLINATION: Vertical LOGGED BY: K. Jankut GROUND ELEV.: 1012
 DATE COMPLETED: 7-11-94 BEARING: Rim CHECKED BY: TOTAL DEPTH: 12'

DEPTH FEET	TYPE- NO.	SAMPLE			REMARKS ON ADVANCE OF BORING	GRAPHIC LOG	SOIL AND ROCK DESCRIPTIONS
		CLONE	PEN.	REC.			
2							
3	S-1	6-7 7-11	24	11	68-B2-SB- C204 1313 hrs. 100-200 ppm		S-1 (11in) SILTY SAND, some silt, fine sand, poorly graded; coarse gravel up to 1/4" in length subrounded. Fine subrounded gravel up to 1/4" in length. Grey-brown (SM)
4	S-2	5-7 7-8	24	10	68-B2-SB- C406 1321 hrs Gravel 7-10"		S-2 (10in) SILTY SAND Fine sand poorly graded. Grey-brown (SM) Rock fragments - lodged in spoon.
7	S-3	7-8 12-13	24	23	68-B2-SB- C608 1324 hrs ppm		S-3 A (8in) SILTY SAND Fine sand to red sand poorly graded. Grey-brown (SM)
9	S-4	8-8 8-8	24	12	68-B2-SB- C810 1334 hrs ppm		S-4 (15in) SAND some silt Fth sand poorly graded Brown (SM)
11	S-5	5-7 7-8	24	24	68-B2-SB- 1012 1340 hrs 9.5 ppm		S-5 (12in) SILTY SAND Fine sand to red coarse sand. Red-brown staining poorly graded (SM)
13							S-5A (6in) SAND to silt - similar to S-4 Reddish brown (SP)
14							
15							S-5B (18in) SILTY SAND Fine sand poorly graded Dark grey-stratified (SM)
16							
17							ECB @ 12' Backfilled
18							w/ bent slurry + sand to 2'; sand to 6'
19							
20							

LEGEND:
 TYPE NO. - Type of sample
 - Rock core sample
 - Soil sample
 BLOWS PER FT. - 40 lb. hammer
 falling 30" to ground
 1 foot below surface
 PEN - Penetration of 100 lb. cone
 REC - Record of cone resistance
 S - Standard Penetration Test

NOTES:

~~See~~

HSA 4 1/4" 8" CD
 ID

2' increments 2" ID spoon

Jan Had's pole readings
 (cont. sampling 2')

DATE: PROJECT NO.:
 PAGE: / OF BORING NO.:

CT 178, NCBC DAVISVILLE, DAVISVILLE, RHODE ISLAND
RECRA ENVIRONMENTAL, INC.

CLIENT ID:
LABORATORY ID:

68B1SB0408
B4031409

68B1SB1012
B4031410

68MW1SB0204
B4031411

INORGANIC SOILS (MG/KG)

ANALYTE	RDL				
TOTAL PETROLEUM HYDROCARBONS	12.5	12.5	U	12.5	U 65
% SOLIDS:		82.0		83.0	88.0

TPH502

SPG 12MW1

CTO 178, NCBC DAVISVILLE, DAVISVILLE, RHODE ISLAND
RECRA ENVIRONMENTAL, INC.

CLIENT ID:
LABORATORY ID:

68MW1SB0810
84031412

68B2SB0204
84031413

68B2SB0810
84031414

68B2SBDUP4
84031417

INORGANIC S ILS (MG/KG)

ANALYTE

RDL

TOTAL PETROLEUM HYDROCARBONS

12.5

12.5 U

30

12.5 U

18

% SOLIDS:

83.0

80.0

76.0

78.0

Appendix A-4

Review Item 85 (UST Southwest of Building E-107) Boring Logs and Analytical Data Summary Table



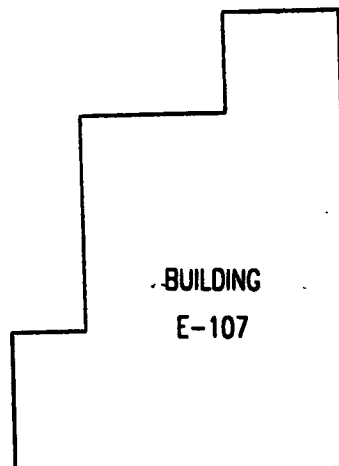
BUILDING
280

BUILDING
279

ALLEN

HARBOR

DOCK



BUILDING
E-107

●
EBS-85-SB-02

● EBS-85-SB-01

LEGEND

● SOIL BORING



NOTES: 1) SAMPLE LOCATION SURVEY PERFORMED BY EA ENGINEERING, MAY 1996
2) ORIGINAL MAP SOURCE: NCBC STATION MAP, 1992

FILE: F:\2960060\2290\CA00\ITEM-85.DWG



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY

DESIGNED BY
JFW

CHECKED BY
JMC

DRAWN BY
JFW

PROJECT MGR.
JMC

DATE
APRIL 1997

SCALE
AS SHOWN

NCBC DAVISVILLE
ENVIRONMENTAL BASELINE
SURVEY (EBS)
FINAL PHASE II EBS REPORT
DAVISVILLE, RHODE ISLAND

REVIEW ITEM 85
BUILDING E-107
SAMPLE LOCATION MAP

PROJECT NO.
29600.60.2290

FIGURE
4-36

**EA Engineering, Science,
and Technology, Inc.**

LOG OF SOIL BORING

Coordinates:

Surface Elevation:

Well Riser Elevation:

Job. No. 29600.60

Client: NORDIV, NAVFAC
NCBC Davisville

Location: EBS 85
South of E-107

Drilling Method: Mobile B-61 rig, pushing 2 in.
and 3 in. (as noted) split spoon samples
continuous.

Boring No.

EBS-85-SB-01

Sampling Method: 2" and 3" OD split-barrel sampler driven by 140-lb hammer falling 30"

Sheet 1 of 1

Drilling Water Level: 1.3 ft bgs
Date: 04/29/96 Time: 05:00 PM

Start	Drilling	Finish
04/29/96	Times	04/29/96
03:40 PM		05:00 PM

Surface Conditions: Grass

[illegible]

SOIL DESCRIPTION

0-14" Silty fine sand, trace angular and rounded gravel to 2", rootlets in top 3". dark olive gray, moist.
14-20" Silty fine sand, dark olive gray, moist.
Silty fine sand, trace pea size gravel, trace roots and twigs, dark olive gray to yellowish-orange at 16", moist to wet at 10".
Silty fine sand, yellowish-orange to dark gray at 9", wet.
Silty fine sand, yellowish-orange and olive gray, wet.
As above.

NOTES:

Sample interval
Sample interval submitted for analysis.
NR - No reading
NA - Not applicable

Logged by:

Judi Shapiro

Drilling Contractor:

M&R Environmental Drilling

Driller:

Phil Thomsbury

CELL SPECIFICATIONS:

Bottom of Hole. 10

Screen Interval: NA
Riser Interval: NA

Sandpack:	NA
Bentonite:	NA

Grout:	NA
Cover:	NA

TABLE 4-1A
BUILDING AND AREA RELATED EBS REVIEW ITEMS
VOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL AND GROUNDWATER SAMPLES
NCBC DAVISVILLE, RI
TARGET COMPOUND LIST VOLATILES BY CLP OLM 01.8 METHOD

SAMPLE ID		EBS 75-SB-02		EBS 85-SB-01		EBS 85-SB-01		EBS 85-SB-02		EBS 85-SB-02		EBS 88-MW-01		EBS 88-MW-01	
SAMPLE INTERVAL		8-10'		0-2'		2-4'		2-4'		8-10'		-		[DUP]	
LAB SAMPLE ID		9606350		9606328		9606329		9606330		9606331		9606276		9606277	
SDG #		960699		960697		960697		960697		960697		960689		960689	
DATE COLLECTED		05/02/96		05/01/96		05/01/96		05/01/96		05/01/96		05/01/96		05/01/96	
DATE ANALYZED		05/08/96		05/06/96		05/06/96		05/08/96		05/08/96		05/09/96		05/09/96	
SAMPLE MATRIX		SOIL		SOIL		SOIL		SOIL		SOIL		WATER		WATER	
DILUTION FACTOR		1.0		1.0		1.0		1.0		1.0		1.0		1.0	
PERCENT SOLIDS		88.0		90.0		87.0		89.0		85.0		25.0		25.0	
COMPOUND	RL	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC ug/Kg	Q	CONC UG/L	Q	CONC UG/L	Q
Chloromethane	10	11	U	11	U	11	U	11	U	12	U	2	UJ	2	U
Bromomethane	10	11	U	11	U	11	U	11	U	12	U	2	UJ	2	U
Vinyl Chloride	10	11	U	11	U	11	U	11	U	12	U	2	UJ	2	U
Chloroethane	10	11	U	11	U	11	U	11	U	12	U	2	UJ	2	U
Methylene Chloride	5	11	U	11	U	11	U	11	U	12	U	2	UJ	3	U
Acetone	10	11	U	63		48	J	28	J	12	U	5	UJ	5	U
Carbon Disulfide	5	11	U	11	U	11	U	11	U	12	U	2	UJ	2	U
1,1-Dichloroethene	5	11	U	11	U	11	U	11	U	12	U	2	UJ	2	U
1,1-Dichloroethane	5	11	U	11	U	11	U	11	U	12	U	2	UJ	2	U
1,2-Dichloroethene (total)	5	11	U	11	U	11	U	11	U	12	U	18	J	16	
Chloroform	5	11	U	11	U	11	U	11	U	12	U	2	UJ	2	U
1,2-Dichloroethane	5	11	U	11	U	11	U	11	U	12	U	2	UJ	2	U
2-Butanone	10	11	U	55	J	99	J	63	J	52	J	5	UJ	5	U
1,1,1-Trichloroethane	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
Carbon Tetrachloride	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
Bromodichloromethane	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
1,2-Dichloropropane	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
cis-1,3-Dichloropropene	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
trans-1,3-Dichloropropene	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
Trichloroethene	5	11	U	11	U	11	U	11	U	12	U	2	J	3	
Dibromochloromethane	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
1,1,2-Trichloroethane	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
Benzene	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
Bromoform	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
4-Methyl-2-Pentanone	10	11	U	11	U	11	U	11	U	12	U	5	U	5	U
2-Hexanone	10	11	U	11	U	11	U	11	U	12	U	5	U	5	U
Tetrachloroethene	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
1,1,2,2-Tetrachloroethane	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
Toluene	5	11	U	36		15		6	J	12	U	2	U	2	U
Chlorobenzene	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
Ethylbenzene	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
Styrene	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U
Xylenes (total)	5	11	U	11	U	11	U	11	U	12	U	2	U	2	U

Appendix A-5

Review Item 86 (Floor Drains, Building E-107)



BUILDING
280

BUILDING
279

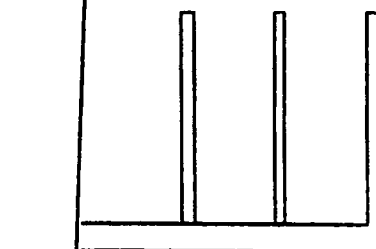
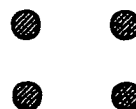
ALLEN

BUILDING
E-107

HARBOR

DOCK

BUILDING
E-107



SUSPECTED OUTFALL FROM FLOOR DRAINS

LEGEND



FLOOR DRAIN



NOTES: 1) SAMPLE LOCATION SURVEY PERFORMED BY EA ENGINEERING, MAY 1996
2) ORIGINAL MAP SOURCE: NCBC STATION MAP, 1992

FILE: F:\2960060\2290\CADD\ITEM-86.DWG

EA EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY

DESIGNED BY
JFW

DRAWN BY
JFW

DATE
APRIL 1997

CHECKED BY
JMC

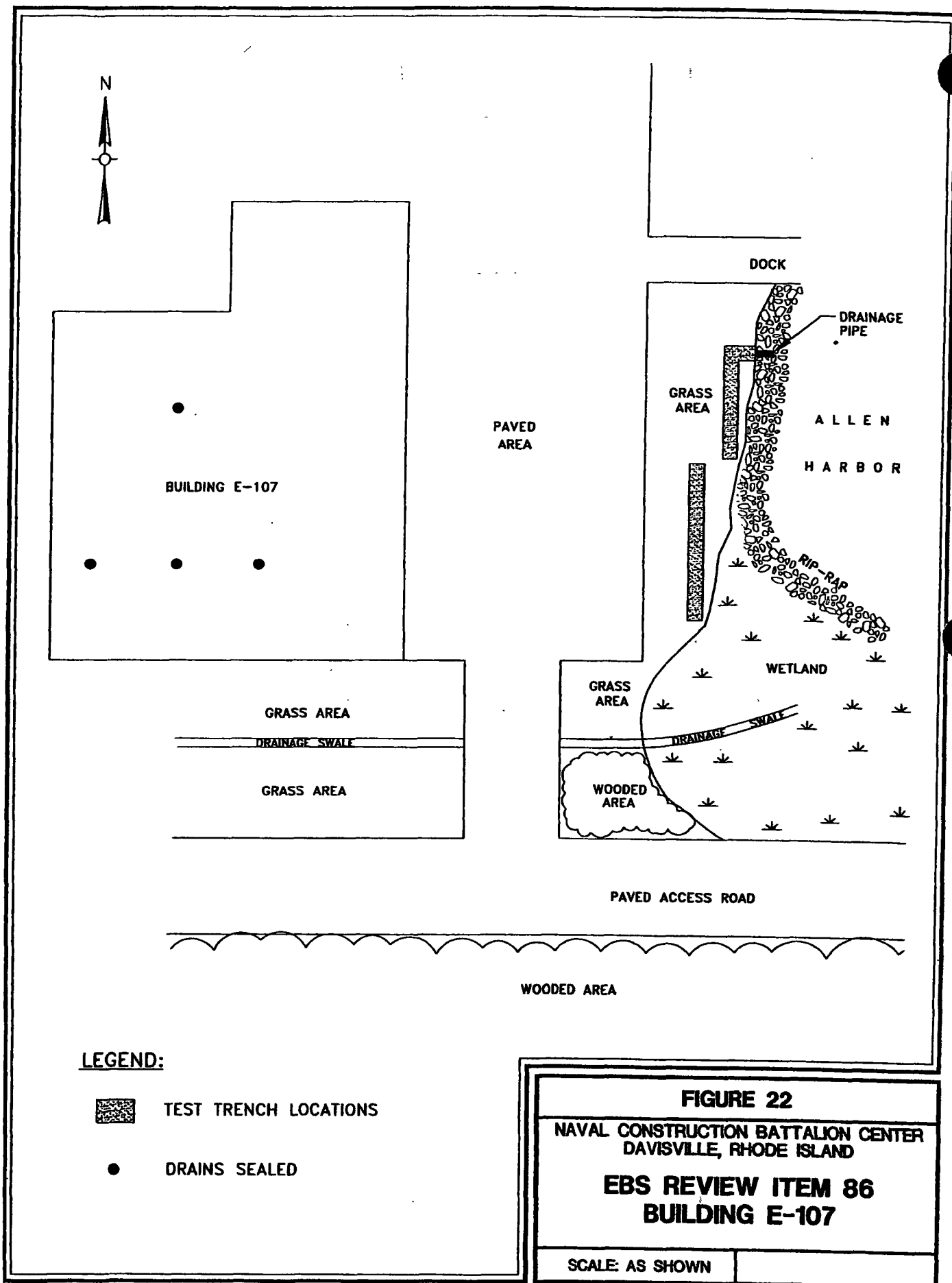
PROJECT MGR.
JMC

SCALE
AS SHOWN

NCBC DAVISVILLE
ENVIRONMENTAL BASELINE
SURVEY (EBS)
FINAL PHASE II EBS REPORT
DAVISVILLE, RHODE ISLAND

REVIEW ITEM 86
BUILDING E-107
SAMPLE LOCATION MAP

PROJECT NO.
29600.60.2290
FIGURE
4-37



APPENDIX B

PHASE II EBS FOLLOW-ON INVESTIGATION

- B-1 Review Item 28 (Former Creosote Dip Tank and Fire Fighting Training Areas)
 Figures and Boring Logs
 Data Validation Reports (included in Volume 2)**
- B-2 Review Item 28 (UST Area)
 Magnetometer Survey Report**
- B-3 Review Item 28 (UST Area)
 Test Pit Logs and Analytical Report (FWENC)**
- B-4 Review Item 28 (UST Area)
 Test Pit Logs (EA/FWENC)**
- B-5 Review Item 60 (Septic Tanks Building E-107)
 Tank Removal - Data Validation Report (included in Volume 2)**

Appendix B-1

**Review Item 28
(Former Creosote Dip Tank and Fire Fighting Training Areas)**

**Figures and Boring Logs
Data Validation Reports (included in Volume 2)**



DAVISVILLE ROAD

EBS-28-SB-16		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	27.7 mg/KG
TPH	14-16	44.4 mg/KG

EBS-28-SB-01		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	568 mg/KG
TPH	8-10	<29.4 mg/KG

EBS-28-SB-03		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	<25.3 mg/KG

EBS-28-SB-02		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	<28.2 mg/KG
TPH	8-10	<29.2 mg/KG

EBS-28-SB-05		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	34.0 mg/KG
TPH	6-8	<29.0 mg/KG

EBS-28-SB-04		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	<26 mg/KG
TPH	2-4	<26 mg/KG

EBS-28-SB-11		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	644 mg/KG
TPH	2-4	127 mg/KG

EBS-28-SB-07		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	706 mg/KG
TPH	2-4	<34 mg/KG
TPH	2-4	176 mg/KG

EBS-28-SB-09		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	1750 mg/KG
TPH	2-4	98.0 mg/KG

EBS-28-SB-10		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	<26 mg/KG
TPH	4-6	<27 mg/KG

EBS-28-SB-15		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	54.9 mg/KG
TPH	2-4	31.4 mg/KG

EBS-28-SB-13		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	<32 mg/KG
TPH	2-4	<26 mg/KG

EBS-28-SB-12		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	35.0 mg/KG
TPH	6-8	<31 mg/KG

EBS-28-SB-08		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	1640 mg/KG
TPH	2-4	810 mg/KG
TPH	4-6	94.5 mg/KG

EBS-28-SB-14		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	32.3 mg/KG
TPH	2-4	<27 mg/KG

EBS-28-SB-06		
ANALYTE	DEPTH	CONCENTRATION
TPH	0-2	552 mg/KG
TPH	8-10	118 mg/KG

WESTCOTT ROAD

ASPHALT - PAVED ROAD

BERMED WOODEN STRUCTURE

CONCRETE RAMP

WOODEN PILINGS

PAVED AREA

APPROX. 136 FT X 76 FT

DARK AREA IN AERIAL PHOTOGRAPH

EARTH RAMP STRUCTURE

LEGEND

- MAGNETIC SURVEY
- INTERPRETIVE DIRECTION OF SHALLOW GROUND-WATER FLOW
- EXISTING PIEZOMETER
- SHALLOW SOIL BORING LOCATION
- DEEP SOIL BORING LOCATION
- DIRECT PUSH GROUND-WATER SAMPLE
- SOIL SAMPLE
- SHALLOW SOIL LOCATION 4/96

TPH READINGS REVIEW ITEM 28 CREOSOTE DIP AREA

NORTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
FINAL PHASE II EBS FOLLOW-ON INVESTIGATION
NCBC DAVISVILLE

DATE 3-4-88
DESIGNED BY RMC
DRAWN BY RWC
CHECKED BY JC
PROJECT MANAGER JC

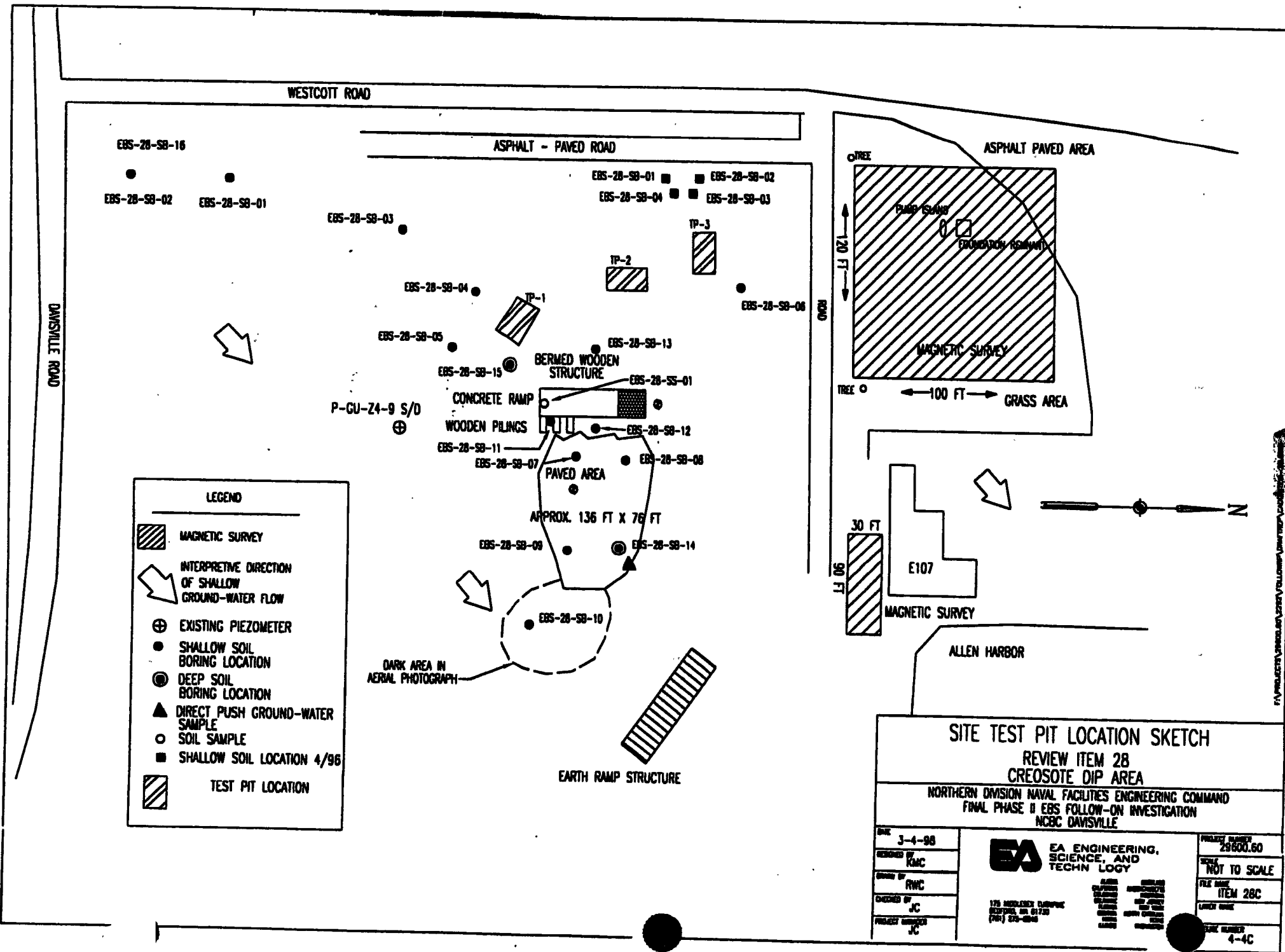


EA ENGINEERING,
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TECHNOLOGY

175 MAGDOCK BLVD
REDFORD, MI 48067
(313) 276-8800

ANALYST
CHECKED BY
DATE
APPROVED BY
DATE

PROJECT NUMBER 29600.60
SCALE NOT TO SCALE
FILE NAME TPH-28
LAYER NAME
FIGURE NUMBER 4-48

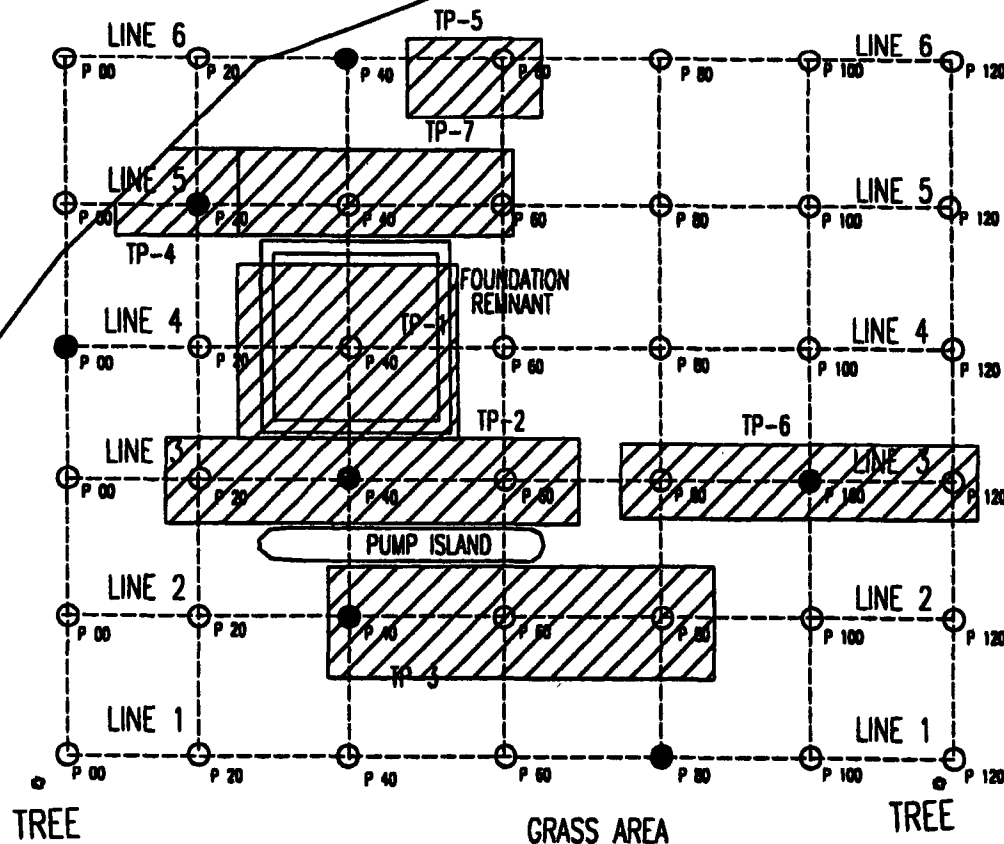


N

ASPHALT PAVED AREA

ASPHALT PAVED AREA

GRASS



PAVED ROAD

WESTCOTT ROAD

GRASS

LEGEND:

● LOCATION OF MAGNETIC ANOMALY
REQUIRING FURTHER INVESTIGATION



TP-1

LOCATION OF TEST PITS

SITE TEST PIT LOCATION SKETCH

REVIEW ITEM 28
MAGNETOMETER SURVEY PUMP ISLAND AREA
NORTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
FINAL PHASE II EBS FOLLOW-ON INVESTIGATION
DAVSVILLE, RHODE ISLAND

DATE 3-4-88
DESIGNED BY RWC
DRAWN BY RWC
CHECKED BY JC
PROJECT MANAGER JC



EA ENGINEERING,
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TECHNOLOGY

175 HIGHLAND AVENUE
PROVIDENCE, RI 02902
(401) 275-8800

PROJECT NUMBER 29800.80
SCALE NOT TO SCALE
FILE NAME FIG 4-40
LAYER NAME
FIGURE NUMBER 4-40

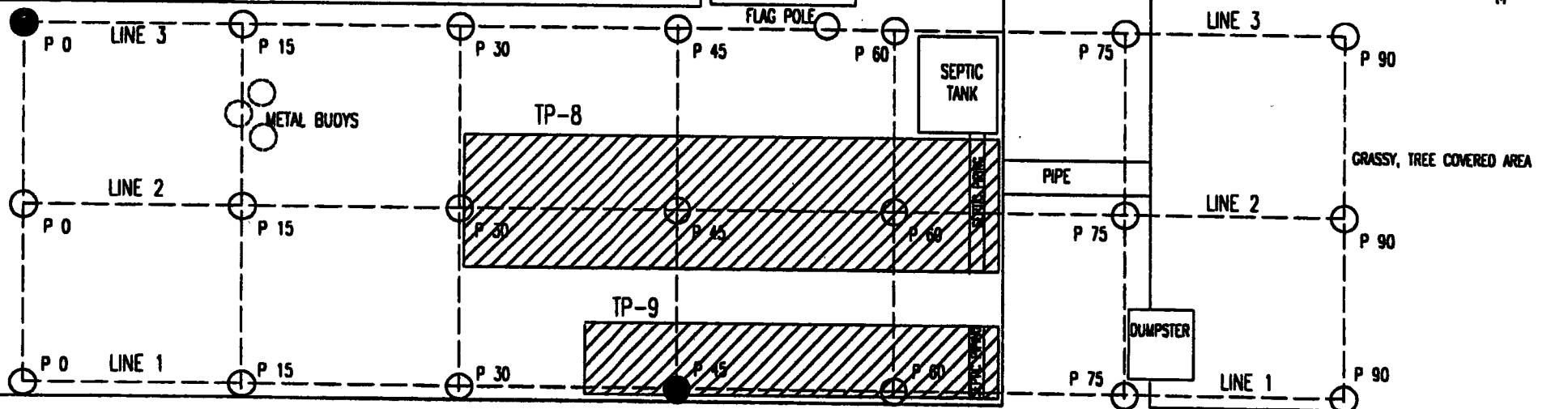
F:\PROJECTS\29800.80\2292\FOLLOWUP\DRAW\TREP\CADD\FIG4-40.DWG

BUILDING E-107

SHED

ALLEN HARBOR

N



LEGEND:

● LOCATION OF MAGNETIC ANOMALY
REQUIRING FURTHER INVESTIGATION



TP-8

LOCATION OF TEST PIT

SITE TEST PIT LOCATION SKETCH
REVIEW ITEM 28
MAGNETOMETER SURVEY BUILDING E-107

NORTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
FINAL PHASE II EBS FOLLOW-ON INVESTIGATION
NCBC DAVISVILLE, RHODE ISLAND

DATE 3-4-98
DESIGNED BY RWC
DRAWN BY RWC
CHECKED BY JC
PROJECT MANAGER JC



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175 WASHINGTON TURNPIKE
BOSTON, MA 02128
(781) 270-0000

PROJECT NUMBER 29600.60
SCALE NOT TO SCALE
FILE NAME FIG4-4E
LAYER NAME
SHEET NUMBER 4-4E

F:\PROJECTS\29600.60\2292\FOLLOWUP\DRW\TREA\CADD\FIG4-4E.DWG



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____
Surface Elevation: _____
Well Riser Elevation: _____

Job. No. 29600.60	Client: NORDIV, NAVFAC NCBC Davisville	Location: EBS 28
Drilling Method: B61 mobile drill pushing 3" OD split barrel sampler continuously.		Boring No. SB-01
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1
Drilling Water Level 10 ft	Date 17 June 97	Start 17 June 97 01:30 PM
Time 03:00 PM		Finish 17 June 97 03:00 PM
Surface Conditions: Grass		

Sample Type	Inches Driven/In. Recrd	Dpth Csg.	Samp # / depth (ft)	PtD (ppm) Above blk	Blows per 6"	Fl bgs	USCS Log	SOIL DESCRIPTION
Soil	24 17		SB-01 0-2'	5.2	2 11 9 6	0 1		0 - 4" Grey/brown, silty, organic soil with roots; dry, loose. 4" - 2' Grey/brown, silty - medium sand with few stones to 1/2"; dry, loose.
	24 14			5.9	2 4 3 6	2 3		2' - 3' Grey/brown, silty - medium sand with few stones to 1/2"; dry, loose. 3' - 4' Yellow/brown, fine - medium sand with 1/2" layer of brown organic material; dry, loose
	24 12			5.4	10 18 14 10	4 5		4' - 6' Dark brown, fine - medium sandy organic material; dry, loose.
	24 18			12.4	18 17 14 16	6 7		6' - 8' Yellow/brown, fine - medium sand; dry, loose.
Soil	24 18		SB-01 8'-10'	19.8	10 11 10 8	8 9		8' - 10' Grey/brown, fine - medium sand; moist, loose.
	24 17			22.0	11 9 9 8	10 11		10' - 12' Grey/brown, fine - medium sand; wet, loose.
						12		End of boring at 12 ft below ground surface. Borehole backfilled with cement grout.
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by: Kevin M. Caldwell
Drilling Contractor: M & R Environmental
Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____
Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____

**EA Engineering, Science,
and Technology, Inc.**

LOG OF SOIL BORING

Coordinates: _____
Surface Elevation: _____
Well Riser Elevation: _____

Job. No. 29600.60	Client: NORDIV, NAVFAC NCBC Davisville	Location: EBS 28
Drilling Method: B61 mobile drill pushing 3" OD split barrel sampler continuously.		Boring No. SB-02
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1
Drilling Water Level 8 ft	Date 18 June 97	Start 18 June 97
Time 08:00 AM		Drilling Times 07:30 AM
Surface Conditions: Grass		Finish 18 June 97 08:00 AM

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above blk.	Blows per 6"	F1 bgs	USCS Log	SOIL DESCRIPTION
Soil	24		SB-02	1.0	2	0		0 - 4" Grey/brown, silty, organic soil; dry, loose.
	18		0-2'		7	1		4" - 2' Grey/brown, silty, fine - medium sand with few rounded stones to 1/2 "; dry, loose.
					10			
					12			
	24			2.0	12	2		2' - 4' Light brown, silty - medium sand; dry, loose.
	16				12			
					8	3		
					9			
	24			1.5	8	4		4' - 6' Light brown, silty - medium sand; dry, loose.
	18				8			
					8	5		
					9			
	24			1.5	10	6		6' - 8' Grey/brown, fine - medium sand; moist, loose.
	20				14			
					14	7		
					13			
Soil	24		SB-02	54.1	10	8		8' - 10' Grey/brown, fine - medium sand; wet, loose.
	20		8'-10'		10			
					8	9		
					8			
						10		End of boring at 10 ft below ground surface. Borehole backfilled with cement grout.
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by: Kevin M. Caldwell
Drilling Contractor: M & R Environmental
Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____
Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No. 29600.60	Client NORDIV, NAVFAC NCBC Davisville	Location EBS 28
Drilling Method: B61 mobile drill pushing 3" OD split barrel sampler continuously.		Boring No. SB-03
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1
Drilling Water Level 8 ft	Date 18 June 97	Start 18 June 97
Time 09:00 AM		Drilling Times 08:20 AM
		Finish 18 June 97 09:00 AM
Surface Conditions: Grass		

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above blk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24		SB-03	16.2	1	0		0-2" Brown, silty, organic soil; dry, loose.
	20		0-2'		1			2" - 2' Grey/brown, fine - medium sand; dry, loose.
					4	1		
					4			
	24			8.9	7	2		2' - 4' Grey/brown, fine - medium sand; dry, loose.
	18				8			
					10	3		
					12			
	24			15.6	12	4		4' - 6' Grey/brown, fine - medium sand; moist, loose.
	20				12			
					16	5		
					27			
Soil	24		SB-03	60.7	27	6		6' - 7' Grey/brown, fine - medium sand; moist, loose.
	12		6' - 8'		30			7' - 8' Brown, silty sand with 25% medium gravel; moist firm.
					16	7		
					21			
	24			42.4	29	8		8' - 10' Brown, silty sand; wet.
	12				32			
					18	9		
					20			
						10		
						1		End of boring at 10 ft below ground surface. Borehole backfilled with cement grout.
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by: Kevin M. Caldwell
Drilling Contractor: M & R Environmental
Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____
Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job. No. 29800.60	Client: NORDIV, NAVFAC NCBC Davisville	Location: EBS 28
Drilling Method: B61 mobile drill pushing 3" OD split barrel sampler continuously.		Boring No. SB-04
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1
Drilling Water Level 8 ft	Date 18 June 97	Start 09:10 AM
Time 09:30 AM		Finish 18 June 97 09:40 AM
Surface Conditions: Grass		

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24		SB-04	16.5	2	0		0 - 2" Brown, silty, organic soil; dry, loose.
	12		0-2'		14			2" - 2" Brown, silty sand; dry, lose.
					14	1		
					10			
Soil	24		SB-04	34.3	13	2		2' - 4' Brown, silty - medium sand; dry, loose.
	14		2'-4'		13			
					15	3		
					18			
	24			34.0	16	4		4' - 6' Brown, silty - medium sand; dry, loose.
	4				16			
					17	5		
					24			
	24			17.1	20	6		6' - 8' Brown, medium - coarse sand with 10% fine gravel; moist, loose.
	8				20			
					116	7		
					12			
	24			54.3	10	8		8' - 10' Brown, medium - coarse sand with 10 % fine gravel; wet, loose.
	6				15			
					15	9		
					20			
						10		End of boring at 10 ft below ground surface. Borehole backfilled with cement grout.
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by:

Kevin M. Caldwell

Drilling Contractor:

M & R Environmental

Driller:

Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____

Screen Interval: _____

Sandpack: _____

Grout: _____

Bottom of Hole: _____

Riser Interval: _____

Bentonite: _____

Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No. 29600.60	Client: NORDIV, NAVFAC NCBC Davisville	Location: EBS 28
Drilling Method: B61 mobile drill pushing 3" OD split barrel sampler continuously.		Boring No. SB-05
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1
Drilling Water Level 6 ft	Date 18 June 97	Start 09:50 AM
Time 10:10 AM		Drilling Times
Surface Conditions: Grass		Finish 18 June 97 10:20 AM

Sample Type	Inches Driven/In. Recvr'd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24	8	SB-05 0-2'	43.5	1	0		0 - 2' Brown, silty, organic soil; dry, loose.
					3			2" - 2' Brown, silty - medium sand; dry, loose.
					3	1		
					3			
	24	10		15.1	6	2		2' - 4' Brown, silty - medium sand; dry, loose.
					12			
					6	3		
					7			
	24	14		16.9	11	4		4' - 6' Brown, silty - medium sand; dry, loose with a 2" layer of black fine - medium sand at 4 1/2 ft.
					21			
					16	5		
					12			
Soil	24	12	SB-05 6'-8'	41.7	12	6		6' - 8' Brown, fine - medium sand; wet, loose.
					10			
					8	7		
					9			
						8		End of boring at 8 ft below ground surface. Borehole backfilled with cement grout.
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by: Kevin M. Caldwell
Drilling Contractor: M & R Environmental
Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____
Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No. 29600.60	Client: NORDIV, NAVFAC NCBC Davisville	Location: EBS 28
Drilling Method: B61 mobile drill pushing a 3" OD split barrel sampler continuously.		Boring No. SB-06
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1
Drilling Water Level 8 ft	Date 18 June 97	Start 18 June 97
Time 11:35 AM		Finish 11:35 AM
Surface Conditions: Grass		

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24		SB-06	9.3	2	0		0 - 2' Brown, silty - fine sand; dry, loose.
	14		0-2'		12			
					11	1		
					6			
	24				5	2		2' - 4' No recovery.
	0				4			
					3	3		
					4			
	24			6.3	4	4		4' - 6' Dark brown, fine - medium sand; moist, loose.
	12				4			
					4	5		
					4			
	24			8.7	4	6		6' - 8' Dark brown, medium - coarse sand with 10% fine gravel; moist, loose.
	2				9			
					21	7		
					22			
Soil	24		SB-06	32.1	20	8		8' - 10' Dark brown, medium - coarse sand with 10% fine gravel; wet, loose.
	8		8'-10'		18			
					21	9		
					23			
						10		
						1		End of boring at 10 ft below ground surface. Borehole backfilled with cement grout.
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by: Kevin M. Caldwell
Drilling Contractor: M & R Environmental
Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____
Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No. 29600.60	Client: NORDIV, NAVFAC NCBC Davisville	Location: EBS 28
Drilling Method: B61 mobile drill pushing a 3" OD split barrel sampler continuously.		Boring No. SB-07
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1
Drilling Water Level	6 ft	Start 18 June 97
Date	18 June 97	Drilling Times
Time	12:20 PM	Finish 18 June 97 12:30 PM
Surface Conditions: Asphalt		

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24	18	SB-07 0-2'	23.3	8	0		0 - 4" Asphalt pavement.
					12			4" - 2' Brown, silty - fine sand; dry, loose.
					13	1		
					14			
Soil	24	17	SB-07 2'-4'	16.4	18	2		2' - 4' Dark brown, fine - medium sand with 10% fine gravel; dry, firm.
					34			
					22	3		
					20			
	24	14		6.0	18	4		4' - 6' Brown, fine - medium sand with 10% fine gravel; moist, firm.
					15			Wood fragments in end of spoon.
					8	5		
					5			
	24	17		7.6	7	6		6' - 8' Black silty - fine sand; wet.
					5			
					8	7		
					9			
						8		End of boring at 8 ft below ground surface. Borehole backfilled with cement grout.
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by:	Kevin M. Caldwell
Drilling Contractor:	M & R Environmental
Driller:	Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser:	Screen Interval:	Sandpack:	Grout:
Bottom of Hole:	Riser Interval:	Bentonite:	Cover:



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No. 29600.60	Client: NORDIV, NAVFAC NCBC Davisville	Location: EBS 28	
Drilling Method: B61 mobile drill pushing a 3" OD split barrel sampler continuously.		Boring No. SB-08	
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1	
Drilling Water Level	8 ft	Start	Drilling
Date	18 June 97	18 June 97	Times
Time	02:45 PM	02:20 PM	Finish
Surface Conditions: Asphalt		18 June 97 03:00 PM	

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"		Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24 16		SB-08 0-2'	12.2	19 15 13 20		0 1		0 - 3" Asphalt pavement. 3" - 2' Black, silty sand; dry, firm.
Soil	24 12		SB-08 2'-4'	35.3	20 22 11 8		2 3		2' - 4' Black, fine - medium sand; dry, loose. 3" layer of black wood at 3 ft.
	24 3			27.8	9 9 17 13		4 5		4' - 6' Black, fine - medium sand with 5% fine gravel; moist. Black ashy material throughout sample.
	24 2			Jar Broken	12 10 18 17		6 7		6' - 8' Black, fine - medium gravel and coarse sand; wet.
	24 2			39.0	8 5 4 7		8 9 10		8' - 10' Black, fine - medium gravel and coarse sand; wet. Porcelain and glass shards in.
									End of boring at 10 ft below ground surface. Borehole backfilled with cement grout.
							1		
							2		
							3		
							4		
							5		
							6		
							7		
							8		
							9		
							0		

NOTES:

Logged by:

Kevin M. Caldwell

Drilling Contractor:

M & R Environmental

Driller:

Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____

Screen Interval: _____

Sandpack: _____

Grout: _____

Bottom of Hole: _____

Riser Interval: _____

Bentonite: _____

Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No. 29600.60	Client NORDIV, NAVFAC NCBC Davisville	Location EBS 28	
Drilling Method: B61 mobile drill pushing a 3" OD split barrel sampler continuously.		Boring No. SB-09	
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1	
Drilling Water Level	6 ft	Start	Drilling
Date	18 June 97	18 June 97	Times
Time	03:30 PM	03:10 PM	Finish
Surface Conditions: Asphalt		18 June 97 03:40 PM	

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above blk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24		SB-09	9.8	4	0		0 - 3" Asphalt pavement.
	17		0-2'		8			3" - 2' Brown, fine - medium sand; dry, loose.
					11	1		
					12			
Soil	24		SB-09	17.4	20	2		2' - 3' Brown, fine - medium sand; dry, loose.
	18		2'-4'		28			3' - 4' Black, fine - medium sand; dry, loose.
					30	3		
					50			
	24				22	4		4' - 6' No recovery.
	0				29			
					20	5		
					31			
	24			2	27	6		6' - 7' Black, medium gravel and coarse sand; wet.
	8				21			7' - 8' Black silt; wet.
					20	7		
					16			
						8		End of boring at 8 ft below ground surface. Borehole backfilled with cement grout.
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by: Kevin M. Caldwell

Drilling Contractor: M & R Environmental

Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____

Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No. 29600.60	Client: NORDIV, NAVFAC NCBC Davisville	Location: EBS 28
Drilling Method: B61 mobile drill pushing a 3" OD split barrel sampler continuously.		Boring No. SB-10
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1
Drilling Water Level 6 ft	Date 19 June 97	Start 19 June 97 07:30 AM
Time 08:40 AM		Finish 19 June 97 08:50 AM
Surface Conditions: Grass		

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24 19		SB-10 0-2'	7.5	3 6 12 19	0 1		0 - 6" Black, silty organic soil; dry. 6" - 2' Black, silty - fine sand; dry.
	24 20			9.0	14 20 30 34	2 3		2' - 4' Brown/black, silty - medium sand with 10% fine gravel; dry, firm.
Soil	24 16		SB-10 4'-6'	23.7	54 77 24 19	4 5		4' - 6' Brown/black, silty - medium sand with 10% fine gravel; moist, firm.
	24 17			13.9	27 30 24 30	6 7 8		6' - 8' Brown/black, silty - coarse sand; wet, firm.
						9		End of boring at 8 ft below ground surface. Borehole backfilled with cement grout.
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by: Kevin M. Caldwell

Drilling Contractor: M & R Environmental

Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____

Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job. No. 29600.60	Client: NORDIV, NAVFAC NCBC Davisville	Location: EBS 28
Drilling Method: B61 mobile drill pushing a 3" OD split barrel sampler continuously.		Boring No. SB-11
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1
Drilling Water Level 6 ft	Date 19 June 97	Start 19 June 97
Time 09:40 AM		Drilling Times 19 June 97
Surface Conditions: Grass		Finish 19 June 97 09:50 AM

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above blk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24		SB-11	31.0	4	0		0 - 6" Black, silty organic soil.
	18		0-2'		11			6" - 2' Black, silty - medium sand; dry, loose.
					13	1		
					15			
Soil	24		SB-11	10.7	20	2		2' - 4' Black, silty - medium sand with 10% medium gravel; dry, loose.
	14		2-4'		20			
					7	3		
					9			
	24			9.2	10	4		4' - 6' Black, silty - medium sand with 10% medium gravel; moist. 2" layer of iron stained debris at 6 ft.
	3				8			
					6	5		
					12			
	24			5.8	31	6		6' - 8' Black silt with 10% fine gravel; wet. 2" layer of iron stained debris at 6 ft.
	8				19			
					18	7		
					15			
						8		End of boring at 8 ft below ground surface. Borehole backfilled with cement grout.
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by: Kevin M. Caldwell
Drilling Contractor: M & R Environmental
Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____
Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No. 29600.60	Client NORDIV, NAVFAC NCBC Davisville	Location EBS 28
Drilling Method: B61 mobile drill pushing a 3" OD split barrel sampler continuously.		Boring No. SB-12
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1
Drilling Water Level	6 ft	Start 19 June 97
Date	19 June 97	Drilling Times
Time	10:30 AM	Finish 19 June 97 10:35 AM
Surface Conditions: Grass		

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24		SB-12	28.5	1	0		0 - 6" Grey/brown, silty sand; dry, loose.
	17		0-2'		2			6" - 2' Black, silty - medium sand with 10% fine gravel; dry, firm.
					7	1		
					9			
	24			31.9	3	2		2' - 4' Black, silty - medium sand with 20% medium gravel; dry. 2" layer of iron stained wood chips in spon.
	6				6			
					6	3		
					11			
	24			18.9	10	4		4' - 6' Black, silty - medium sand with 10% fine gravel; dry.
	3				10			
					15	5		
					12			
Soil	24		SB-12	10.2	10	6		6' - 8' Black, silty - medium sand; wet.
	8		6-8		30			
					15	7		
					20			
						8		End of boring at 8 ft below ground surface. Borehole backfilled with cement grout.
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by: Kevin M. Caldwell
Drilling Contractor: M & R Environmental
Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____
Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job. No.
29600.60

Client: NORDIV, NAVFAC
NCBC Davisville

Location:

EBS 28

Drilling Method: B61 mobile drill pushing a 3" OD
split barrel sampler continuously.

Boring No.

SB-13

Sampling Method: 3" OD split barrel sampler
driven by a 140 lb hammer falling 30 in.

Sheet 1 of 1

Drilling Water Level 6 ft

Start

Drilling

Finish

Date 19 June 97

19 June 97

Times

19 June 97

Time 11:20 AM

10:50 AM

11:20 AM

Surface Conditions: Grass

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24	17	SB-13 0-2'	10.2	1	0		0 - 6" Brown silty organic soil; dry.
					6			6" - 2' Brown, silty - fine sand; dry, loose.
					6	1		
					7			
Soil	24	19	SB-13 2'-4'	15.2	3	2		2' - 4' Brown, silty - medium sand; dry, loose.
					3			
					4	3		
	24			9.1	7	4		4' - 6' Brown, silty - medium sand; dry, loose.
		14			2			
					2	5		
					2			
	24			5.7	3	6		6' - 8' Brown, silty - medium sand; wet, loose.
		18			2			
					3	7		
					3			
						8		End of boring at 8 ft below ground surface. Borehole backfilled with cement grout.
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by:

Kevin M. Caldwell

Drilling Contractor:

M & R Environmental

Driller:

Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____

Screen Interval: _____

Sandpack: _____

Grout: _____

Bottom of Hole: _____

Riser Interval: _____

Bentonite: _____

Cover: _____



**EA Engineering, Science,
and Technology, Inc.**

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No. 29600.60	Client: NORDIV, NAVFAC NCBC Davisville	Location: EBS 28
Drilling Method: B61 mobile drill pushing a 3" OD split barrel sampler continuously.		Boring No. SB-14
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 3
Drilling Water Level 8 ft	Date 20 June 97	Start 20 June 97
Time 11:00 AM		Drilling Times
Surface Conditions: Asphalt		Finish 23 June 97 11:00 AM

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above blk.	Blows per 6"		Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24		SB-14 0-2'	11.6	5		0		0 - 6" Asphalt pavement.
	21				8				6" - 2' Brown, silty - medium sand with 5% fine gravel; dry, loose.
					16		1		
					19				
	24				18		2		2' - 4' Brown, silty - medium sand with 5% fine gravel; dry, firm.
	14			22.6	10				
					16		3		
					15				
	24				19		4		4' - 6' No recovery.
	0				10				
					5		5		
					4				
	24				2		6		6' - 8' No recovery.
	0				3				
					3		7		
					2				
Soil	24		SB-14 8'-10'	22.2	3		8		8' - 10' Black, medium - coarse sand with 50% fine - medium gravel; wet. Some wood and glass debris in sample.
	4				4				
					5		9		
					3				
	24	10		19.7	2		10		10' - 12' Black, medium - coarse gravel and coarse sand; wet, loose.
	3				4				
					4		11		
					3				
	24	10		21.1	3		12		12' - 14' Black medium - coarse sand; wet, loose.
	9				2				
					2		13		
					4				
	24	10		16.8	8		14		14' - 16' Black silt with few wood chips; wet.
	3				8				
					20		15		
					18				
	24	16		21.2	19		16		16' - 18' Black silt; wet.
	24				22				
					20		17		
					18				
	24	16		3.5	8		18		18' - 20' Black, silty - medium sand; wet.
	3				10				
					9		19		
					9				
							20		

NOTES:

Logged by: Kevin M. Caldwell

Drilling Contractor: M & R Environmental

Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____

Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____

EA Engineering, Science, and Technology, Inc. LOG OF SOIL BORING Coordinates: _____ Surface Elevation: _____ Well Riser Elevation: _____										Job. No. 29600.60		Client: NORDIV, NAVFAC NCBC Davisville		Location: EBS 28	
										Drilling Method: B61 mobile drill pushing a 3" OD split barrel sampler continuously				Boring No. SB-14	
										Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.					
										Drilling Water Level 8 ft		Date 20 June 97		Start 20 June 97 07:00 AM	
										Time 11:00 AM		Surface Conditions: Asphalt		Finish 23 June 97 11:00 AM	
Sheet 2 of 3															

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
	24	16		10.4	12	20		20' - 22' Black/grey, silty - medium sand; wet, firm.
	24				12			
					13	21		
					12			
	24	12	22	2.1	7	22		22' - 24' Black, silty - medium sand with a layer of black silt at bottom of spoon; wet.
					10			
					12	23		
					12			
	24	15	22	2.3	12	24		24' - 26' Bands of black silt, fine gravel and medium - coarse sand; wet.
					24			
					27	25		
					32			
	24	15	22	2.6	30	26		26' - 28' 6" layer of coarse sand on top of black silt; wet.
					30			
					17	27		
					12			
	24	18	26	0.0	5	28		28' - 30' Black silt with trace clay; wet, loose.
					5			
					7	29		
					7			
	24	16	28	0.2	11	30		30' - 32' Black silt with trace clay with a layer of coarse sand at bottom of spoon; wet.
					12			
					20	31		
					23			
	24	15	32	0.2	17	32		32' - 34' Brown weathered rock and coarse sand; wet, firm.
					32			
					68	33		
					48			
	24	18	32	0.1	25	34		34' - 36' Brown weathered rock and coarse sand on top of black silt and trace clay; wet, firm.
					19			
					20	35		End drilling on 20 June 97.
					34			
	24	13	36	16.0	9	36		36' - 38' Black, silty - medium sand; wet, firm.
					11			
					15	37		
					10			
	24	24	36	3.1	16	38		38' - 40' Black, silty - medium sand; wet, firm. Some iron staining present.
					20			
					25	39		
					38			
						40		

NOTES:

Logged by: Kevin M. Caldwell

Drilling Contractor: M & R Environmental

Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____

Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____

**EA Engineering, Science,
and Technology, Inc.**

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job. No. 29600.60	Client: NORDIV, NAVFAC NCBC Davisville	Location EBS 28
Drilling Method: B61 mobile drill pushing a 3" OD split barrel sampler continuously.		Boring No. SB-14
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 3 of 3
Drilling Water Level Date Time	8 ft 20 June 97 11:00 AM	Start 20 June 97 07:00 AM
Surface Conditions: Asphalt		Drilling Times 23 June 97 11:00 AM

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk. 6"	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
	24 18	39		0.7	9 19 27 356	40		40' - 42' Black, silty - medium sand; wet.
						41		
Soil	24 9	39	SB-14 42'-44'	1.2	90 110	42		42' - 44' Black, silty - medium sand; wet. Broken rock in last 3 in of spoon.
						43		End of boring at 42' 9." Borehole backfilled with cement grout.
						44		
						5		
						6		
						7		
						8		
						9		
						0		
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by: Kevin M. Caldwell

Drilling Contractor: M & R Environmental

Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____

Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job. No. 29600 60	Client: NORDIV, NAVFAC NCBC Davisville	Location: EBS 28
Drilling Method: B61 mobile drill pushing a 3" OD split barrel sampler continuously.		Boring No. SB-15
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 2
Drilling Water Level	6 ft	Start 23 June 97
Date	23 June 97	Drilling Times
Time	02:00 PM	Finish 24 June 97 11:30 AM
Surface Conditions: Grass		

Sample Type	Inches Driven/In. Recvd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above blk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24		SB-15	0.0	2	0		0 - 1' Brown, silty organic soil; dry.
	10		0 - 2'		4			1' - 2' Brown, silty sand with 25% medium gravel; dry.
					8	1		
					2			
	24			1.3	1	2		2' - 4' Dark brown/black organic material; dry.
	2				3			
					2	3		
					1			
	24			3.3	4	4		4' - 6' Brown/black silty sand; dry.
	6				5			
					6	5		
					2			
	24			0	3	6		6' - 8' Brown, silty - medium sand; wet.
	12				6			
					4	7		
					2			
	24			2	5	8		8 - 10' Brown, fine - medium sand; wet.
	12				5			
					7	9		
					8			
	24			1	8	10		10' - 12' Brown, fine - medium sand; wet.
	12				8			
					8	11		
					1			
	24			3.0	9	12		12' - 14' Brown, fine - medium sand; wet.
	24				12			
					11	13		
					12			
	24			0.5	19	14		14' - 16' Brown, fine - coarse sand with 50% medium gravel; wet.
	14				107			
					37	15		
					50			
	24			0.0	66	16		16' - 18' Brown, fine - medium sand with 50% medium - coarse gravel; wet.
	24				43			
					69	17		
					67			
	24			0.0	21	18		18' - 20' Brown, fine - medium sand with 50% medium - coarse gravel; wet.
	9				20			
					9	19		
					8			
						20		

NOTES:

Logged by: Kevin M. Caldwell

Drilling Contractor: M & R Environmental

Driller: Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____

Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____

EA Engineering, Science, and Technology, Inc. LOG OF SOIL BORING Coordinates: _____ Surface Elevation: _____ Well Riser Elevation: _____										Job. No. 29600.60		Client NORDIV, NAVFAC NCBC Davisville		Location: EBS 28	
										Drilling Method: B61 mobile drill pushing a 3" OD split barrel sampler continuously.				Boring No. SB-15	
										Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.					
										Drilling Water Level 6 ft		Date 23 June 97		Start 23 June 97	
Time 02:00 PM		Surface Conditions: Grass				02:00 PM		11:30 AM							

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24	18		0.0	8	20		20' - 22' Brown/black, coarse sand; wet. Black silt with coarse gravel in last 3" of spoon.
	24				20	21		
					40			
					49			
	24	22		0.0	20	22		22' - 24' Black, silty - coarse sand with 50% coarse gravel.
	14				54			
					65	23		
					50			
	24	22		0.4	23	24		24' - 26' Black silt; wet, firm.
	16				30			
					54	25		
					22			
	24			0.0	11	26		26' - 28' Black silt; wet, firm.
	12				8			
					8	27		
					10			
	24			0.2	7	28		28' - 30' Black silt; wet, firm.
	12				8			
					19	29		
					27			
Soil	24		SB-15 30'-32'	0.2	19	30		30' - 32' Black silt; wet, firm.
	11				42			
					107	31		
					53			
						32		32' - 34' Rollerbit through rock.
						33		
						34		End of boring at 34 ft below ground surface. Borehole backfilled with cement grout.
						15		
						16		
						17		
						18		
						19		
						20		

NOTES:

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____

Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____

Logged by: Kevin M. Caldwell

Drilling Contractor: M & R Environmental

Driller: Brad Haas, William Williams



EA Engine ring, Science,
and Techn ology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No. 29600.60	Client: NORDIV, NAVFAC NCBC Davisville	Location: EBS 28
Drilling Method: B61 mobile drill pushing 3" OD split barrel sampler continuously.		Boring No. SB-16
Sampling Method: 3" OD split barrel sampler driven by a 140 lb hammer falling 30 in.		Sheet 1 of 1
Drilling Water Level 14 ft	Date 24 June 97	Start 24 Jun 97
Time 01:00 PM		Drilling Times
Surface Conditions: Grass		Finish 24 Jun 97 01:30 PM

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bl.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
Soil	24		SB-16	0.7	2	0		0 - 2' Grey, fine - medium sand; dry, loose.
	14		0 - 2'		3			
					6	1		
					6			
	24			0.2	6	2		2' - 4' Grey, fine - medium sand; dry, loose.
	18				6			
					6	3		
					5			
	24			0.2	6	4		4' - 6' Grey, fine - medium sand; dry, loose. Rust colored gravel in last 2" of spoon.
	19				6			
					12	5		
					12			
	24			0.3	13	6		6' - 8' Grey, coarse sand with 10% fine gravel; dry.
	16				13			
					14	7		
					12			
	24			0.8	10	8		8' - 10' Grey, medium - coarse sand; dry.
	18				10			
					5	9		
					5			
	24			1.8	5	10		10' - 12' Grey, medium - coarse sand with 10% fine gravel; dry.
	17				5			
					6	11		
					3			
	24			0.9	10	12		12' - 14' Grey, medium - coarse sand with 10% fine gravel; dry.
	18				11			
					11	13		
					12			
Soil	24		SB-16	1.4	8	14		14' - 16' Grey, medium - coarse sand with 10% fine gravel; wet.
	18		14'-16'		10			
					8	15		
					8			
	24			0.9	8	16		16' - 18' Grey, medium - coarse sand with 10% fine gravel; wet.
	24				8			
					11	17		
					8			
						18		End of boring at 18 ft below ground surface. Boring backfilled with cement grout.
						9		
						0		

NOTES:

Logged by:

Kevin M. Caldwell

Drilling Contractor:

M & R Environmental

Driller:

Brad Haas, William Williams

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____

Screen Interval: _____

Sandpack: _____

Grout: _____

Bottom of Hole: _____

Riser Interval: _____

Bentonite: _____

Cover: _____

**EBS Follow-on Investigation
NCBC Davisville RI**

Review Item	Location	Sample Number	Date Collected	SDG #	Matrix	Compounds Analyzed
15	Building S-112	EBS-15-RSS-50	6/27	970938	soil	TPH 418.1, 8015M, VOC, SVOC
15	Building S-112	EBS-15-RSS-51	6/27	970938	soil	TPH 418.1, 8015M, VOC, SVOC
15	Building S-112	EBS-15-RSS-01	7/2	970965	soil	TPH 418.1, 8015M VOC, SVOC
15	Building S-112	EBS-15-RSS-02	7/2	970965	soil	TPH 418.1, 8015M VOC, SVOC
15	Building S-112	EBS-15-RSS-03	7/2	970965	soil	TPH 418.1, 8015M VOC, SVOC
15	Building S-112	EBS-15-RSS-04	7/2	970965	soil	TPH 418.1, VOC, SVOC
15	Building S-112	EBS-15-RSS-06	7/2	970965	soil	TPH 418.1, 8015M VOC, SVOC
21	DC-133	EBS21-NSS-01	7/17	971072	ground water	VOC, SVOC TPH 418.1
21	DC-133	EBS21-NSS-02	7/17	971072	ground water	VOC, SVOC TPH 418.1
21	DC-133	EBS21-GW-1	7/16	971050	ground water	VOC, SVOC
21	DC-133	EBS21-GW-2	7/16	971050	ground water	VOC, SVOC
21	DC-133	EBS21-GW-3	7/16	971052	ground water	VOC, SVOC
22	New DRMO Laydown Area	EBS-22-RSB-01-O-2'	6/27	970938	soil	TPH 418.1, VOC, SVOC
22	New DRMO Laydown Area	EBS-22-RSB-01-2-4	6/27	970938	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-GW-1	7/17	971071	ground water	VOC, SVOC

**EBS Follow-on Investigation
NCBC Davisville, RI**

Review Item	Location	Sample Number	Date Collected	SDG #	Matrix	Compounds Analyzed
28	Creosote Dip Tank Area	EBS-28-GW-2	7/17	971071	ground water	VOC, SVOC
28	Creosote Dip Tank Area	EBS28-SS-01	7/1	970965	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-01-0-2'	6/17	970886	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-01-8'-10'	6/17	970886	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-02-0-2'	6/18	970886	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-02-8'-10'	6/18	970886	soil	TPH 418.1, 8015M VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-03-0-2'	6/18	970886	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-03-6'-8'	6/18	970886	soil	TPH 418.1, 8015M VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-04-0-2'	6/18	970886	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-04-2'-4'	6/18	970886	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-05-0-2'	6/18	970886	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-05-6'-8'	6/19	970894	soil	TPH 418.1, VOC, SVOC TPH8015M
28	Creosote Dip Tank Area	EBS-28-SB-06-0-2'	6/18	970886	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-06-8'-10'	6/19	970894	soil	TPH 418.1, VOC, SVOC TPH8015M

**EBS Follow-on Investigation
NCBC Davisville, RI**

Review Item	Location	Sample Number	Date Collected	SDG #	Matrix	Compounds Analyzed
28	Creosote Dip Tank Area	EBS-28-SB-07-0-2'	6/18	970886	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-07-2'-4'	6/18	970886	soil	TPH 418.1, VOC, SVOC TPH8015M
28	Creosote Dip Tank Area	EBS-28-SB-08-0-2'	6/18	970894	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-08-2'-4'	6/18	970894	soil	TPH 418.1, VOC, SVOC TPH8015M
28	Creosote Dip Tank Area	EBS-28-SB-09-0-2'	6/18	970894	soil	TPH 418.1, VOC, SVOC, TPH 8015M
28	Creosote Dip Tank Area	EBS-28-SB-09-2'-4'	6/18	970894	soil	TPH 418.1, VOC, SVOC TPH8015M
28	Creosote Dip Tank Area	EBS-28-SB-10-0-2'	6/19	970894	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-10-4'-6'	6/19	970894	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-11-0-2'	6/19	970894	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-11-2'-4'	6/19	970894	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-12-0-2	6/19	970894	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-12-6'-8'	6/19	970894	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-13-0-2'	6/19	970894	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-13-2'-4'	6/19	970894	soil	TPH 418.1, VOC, SVOC

**EBS Follow-on Investigation
NCBC Davisville, RI**

Review Item	Location	Sample Number	Date Collected	SDG #	Matrix	Compounds Analyzed
28	Creosote Dip Tank Area	EBS-28-SB-14-0-2'	6/20	970894	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-14-2'-4'	6/20	970894	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-14-42'-44'	6/23	970904	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-15-0-2'	6/23	970904	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-15-30'-32'	6/24	970904	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-16-0-2'	6/24	970904	soil	TPH 418.1, VOC, SVOC
28	Creosote Dip Tank Area	EBS-28-SB-16-14'-16'	6/24	970904	soil	TPH 418.1, VOC, SVOC
30	Laydown Area	EBS-30-RSB-01-0-6"	6/27	970938	soil	TPH 418.1, VOC, SVOC
30	Laydown Area	EBS-30-RSB-01-2-4 (Dupe of 0-6")	6/27	970938	soil	TPH 418.1, VOC, SVOC
31	Old DRMO Scrapyard	EBS31-RSS-11	7/1	970965	soil	TPH 418.1, VOC, SVOC
31	Old DRMO Scrapyard	EBS-31-RSS-02	6/27	970938	soil	TPH 418.1, VOC, SVOC
31	Old DRMO Scrapyard	EBS-31-RSS-06	6/27	970938	soil	TPH 418.1, VOC, SVOC
31	Old DRMO Scrapyard	EBS-31-RSS-07	6/27	970938	soil	TPH 418.1, VOC, SVOC
31	Old DRMO Scrapyard	EBS-31-RSS-09	6/27	970938	soil	TPH 418.1, VOC, SVOC, TPH 8015M
31	Old DRMO Scrapyard	EBS-31-RSS-12	6/27	970938	soil	TPH 418.1, VOC, SVOC

**EBS Follow-on Investigation
NCBC Davisville, RI**

Review Item	Location	Sample Number	Date Collected	SDG #	Matrix	Compounds Analyzed
31	Old DRMO Scrapyard	EBS-31-RSS-13	6/27	970938	soil	TPH 418.1, VOC, SVOC
34	Building 314	EBS34-RSPT-01	7/17	971063	soil	TPH 418.1,8015M, VOC, SVOC RCRA Metals
34	Building 314	EBS34-RSPT-02 (DUP OF 01)	7/17	971063	soil	TPH 418.1,8015M, VOC, SVOC RCRA Metals
44	Former Building A-89	EBS44-RSPT-01	7/15	971052	soil	TPH 418.1,8015M, VOC, SVOC RCRA Metals
45	Buildings 31, 67, and 68	EBS45-RSPT-01	7/15	971052	soil	TPH 418.1,8015M, VOC, SVOC RCRA Metals
51	Building S-101	EBS-51-GW-1	7/15	971050	ground water	VOC
51	Building S-101	EBS-51-GW-2	7/15	971050	ground water	VOC
51	Building S-101	EBS-51-GW-3	7/15	971050	ground water	VOC
51	Building S-101	EBS-51-GW-4	7/15	971050	ground water	VOC
54	Building 378	EBS-54-RSPT-01	7/14	971023	soil	TPH 418.1, TPH 8015M, VOC, SVOC RCRA Metals
56	Building 224	EBS-56-RSPT-01	7/14	971023	soil	TPH 418.1, TPH 8015M, VOC, SVOC, RCRA Metals
56	Building 224	EBS-56-RSPT-02	7/14	971023	soil	TPH 418.1, TPH 8015M, VOC, SVOC, RCRA Metals
57	Building 39	EBS-57-RSPT-01	7/14	971023	soil	TPH 418.1, TPH 8015M, VOC, SVOC, RCRA Metals
58	Building E-319	EBS58-RSPT-01	7/17	971063	soil	TPH 418.1,8015M, VOC, SVOC RCRA Metals

Appendix B-2

Review Item 28 (UST Area)

Magnetometer Survey Report

**FINAL
MAGNETOMETER SURVEY REPORT
EBS REVIEW ITEM 28, CREOSOTE DIP TANK AREA
NAVAL CONSTRUCTION BATTALION CENTER
DAVISVILLE, RHODE ISLAND**

Contract No. N62472-92-D-1296
Contract Task Order No. 0060

Prepared for

Department of the Navy, Northern Division
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop No. 82
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Final
29600.60.2202

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1	Review Item 28, Pump Island Area Magnetometer Survey
2	Review Item 28, Building E-107 Magnetometer Survey

1. INTRODUCTION

EA Engineering, Science, and Technology (EA) was authorized to perform a magnetometer survey for Review Item 28 under Contract No. N62472-92-D-1296, Northern Division, Naval Facilities Engineering Command Contract Task Order (CTO) No. 0060 at the Naval Construction Battalion Center, Davisville, Rhode Island (NCBC Davisville). This task of the CTO consisted of:

- Performance of a Magnetometer Survey in the vicinity of Building E-107 and the pump island area located to the west of Building E-107 to evaluate the three tanks reportedly located in the pump island area and one tank reportedly located at the southeast corner of Building E-107 (Figure 1-2).

This report presents the results and findings of the Magnetometer Surveys.

1.1 DESCRIPTION OF THE BASE

NCBC Davisville is located in the Town of North Kingstown, Rhode Island, approximately 18 miles south of the state capitol, Providence. A significant portion of NCBC Davisville Main Center is adjacent to Narragansett Bay. NCBC Davisville is composed of three areas: the Main Center; the West Davisville storage area; and Camp Fogarty, a training facility located approximately four miles west of the Main Center (Figure 1-1). Adjoining NCBC Davisville Main Center's southern boundary is the decommissioned Naval Air Station (NAS) Quonset Point, which was transferred by the Navy to the Rhode Island Port Authority (RIPA) in April 1973 (TRC 1994).

NCBC Davisville was primarily used for training naval seamen in construction operations, and as storage and freight yards for construction materials. As a result, the NCBC is comprised primarily of warehouse space and freight yards, most of which are currently empty. In 1974, the NAS and the Naval Air Rework Facility (NARF) at Quonset Point were decommissioned, and operations at Davisville were greatly reduced pursuant to the Shore Establishment Realignment Act of 1973. In 1989, NCBC Davisville was added to the National Priorities List (54 Federal Register 48184, 1989). In 1991, the closure of NCBC Davisville was announced, and operations were phased down to minimum staffing levels for public works, maintenance and security (EA 1995). NCBC Davisville closed on 1 April 1994. Most of the staff and materials have been moved offsite. Currently, facilities management and security staff engaged with base closure remain on base.

1.2 EBS Review Item 28: Creosote Dip Tank Area

EBS Review Item 28 is located in Zone 3 of NCBC Davisville (Figure 1-1). The Review Item consists of one Building (E-107) and the area west and south of the building including an area possibly used for creosote dipping activities (Figure 1-2). Halliburton NUS (1992) conducted a soil removal action in a spill area around an upended creosote dip tank.

A fire training area was also recently reported to have been located in an asphalt-paved area to the east of the former dip tanks (Figure 1-2). During the 1960's, structures were allegedly constructed, doused with oil, then set on fire to be extinguished. The area was reportedly paved over.

Four underground storage tanks are reported to have been located near Building E-107. Three of the tanks are reported to have been located to the west of Building E-107 (in the pump island area) and 1 tank is reported to have been located at the southeast corner of the building (Figure 1-2).

1.3 SCOPE OF WORK

A magnetometer survey was conducted in the area of the alleged underground storage tanks to the west of Building E-107 (in the area around the pump island) and at the southeast corner of the building. A grid was established in a 100 by 120 ft area with the pumping island near the center of the grid (Figure 1-3). An appropriate grid spacing was established (20 ft by 20 ft spacing) which was determined appropriate given the target size and depth and the type of magnetometer used. When anomalies were detected, a stake was placed at the locations for further investigation through test pit excavation at a later date. A smaller grid (30 by 90 ft) was established on the southeast side of E-107 to look for anomalies that may be associated with buried tank (Figure 1-4).

1.4 SURVEY OBJECTIVES

The purpose of these surveys is to identify magnetic anomalies that may be associated with the underground storage tanks or connective piping.

2. SCOPE OF SURVEY

In June 1997, a Magnetometer Survey was conducted in the area of the alleged underground storage tanks to the west of Building E-107 (in the area around the pump island) and at the southeast corner of the building.

A grid was established in a 100 by 120 ft area with the pumping island near the center of the grid (Figure 1-3). An appropriate grid spacing was established (20 ft by 20 ft spacing) taking into account the target size and depth and the type of magnetometer used. The lines were trending from west to east along a grass covered area located west of Building E-107. Line 1 was located furthest south, Line 6 was furthest north. Each line began at Position 0 and extended to Position 120 toward the east with readings taken every 20 ft.

A smaller grid (30 by 90 ft) was established near Building E-107 to look for anomalies that may be associated with the alleged buried tank (Figure 1-4). Three lines were used on the southeastern side of the building extending from west to east. Each line was 90 ft long and magnetometer readings were taken at 15 ft position intervals.

2.1 PROCEDURE AND DATA ACQUISITION

A Geometrics G856AX Extended Memory Proton Precession Magnetometer was used to conduct the survey. This instrument is capable of measuring the total magnetic field using a single sensor. The location of the survey lines and measurement points are shown on Figures 1-3 and 1-4. Total magnetic field measurements are presented on Table 1 for the larger survey area (pump island area) and Table 2 for the survey conducted near Building E-107.

2.1.1 Magnetometer Survey

On 3 June 1997, EA conducted a Magnetometer Survey at Review Item 28. The survey included six survey lines (Lines 1 through 6) in the area around the pump island located west of Building E-107 (Figure 1-3) and three lines (Lines 1 through 3) located adjacent to the southeast corner of Building E-107 (Figure 1-4).

Magnetometer measurements were collected in a 20 X 20 ft grid in the pump island area and in a 15 X 15 ft grid near the building to provide adequate sensitivity to detect one 55-gal drum at a distance of 15 ft from the magnetometer sensor.

Magnetometer measurements were taken at each position location for total field in gammas. The total field (TF) mode is useful for gathering information on deep anomalies. The sensor of the magnetometer was positioned 4 ft above ground surface for all readings.

Total Field measurements were manually recorded in the field logbook and are summarized in Table 1 and Table 2. Each position location was marked with a pin flag which was removed at the end of the survey. Corner locations are marked with wooden stakes which were pounded

close to the ground surface so that they will not be removed during grass mowing. In addition, observations of visual debris and other above ground anomalies encountered on the ground surface (i.e, metal objects, power lines, etc) in the vicinity of the position location were also recorded in the field log book (summarized in Table 1 and Table 2). Photographs were taken to document magnetometer locations and field observations. Any other observations, including weather conditions, were also noted in a field logbook.

Total field measurements were plotted versus distance (y and x axis, respectively) for comparison of the data and to facilitate interpretation of the measurements along each line traveled. Figures 2-1 through 2-6 represent data for the pump island survey and Figures 2-7 through 2-9 represent the data for the survey conducted near Building E-107.

2.2 SITE CONDITIONS OBSERVED DURING THE SURVEY

During the magnetometer survey, EA personnel observed a notable amount of debris along the southern side of Building E-107. The relative amount and types of debris were logged in the field log book (see Tables 1 and 2). The types of debris noted included large metal buoys, drainage piping located in the road near Building E-107, various other metal frames and structures behind Building E-107, and the pump island in the center of the survey west of Building E-107.

The weather conditions during the survey included temperatures ranging from approximately 55-60°F degrees over the course of the day, mostly to partly cloudy with light-to-moderate winds.

2.3 DISCUSSION OF SURVEY RESULTS

2.3.1 Survey West of Building E-107, Pump Island Area

Review of the magnetic signatures for the pump island area indicate that the highest measurements obtained during the survey were obtained from this area on Line 5 at Position 20.

Examination of the TF measurements obtained in the pump island area (Lines 1 through 6) indicate that further investigation is required for Line 1; Position 80, Line 2; Position 40, Line 3; Positions 40 and 100, Line 4; Position 0, Line 5; Position 20 and Line 6; Position 40 (Figure 1-3). These positions have been staked for further investigation.

Survey Findings

After reviewing the TF data for the points measured, several observations can be made which are presented below by their respective line designation.

Line 1:

Line 1 is located along the tree line on the southern most part of the survey area. Review of the magnetic signatures indicate that a small rise in the magnetic signature between Position 40 and 100 (Figure 2-1). During excavation, it is recommended that the excavator start the dig at Position 80 and extend out to Position 40 or 100. These locations have been staked.

Line 2:

Line 2 is located 20 ft north of Line 1 in the pump island area. This magnetic signature rises at Position 40 near the pump island. Position 60 is also near the pump island but shows a decrease in magnetic signature as compared with Position 40 (Figure 2-2). Position 40 has been staked for further investigation. During excavation, it is recommended that the excavator dig from Line 2; Position 40 toward Line 3 as this anomaly appears to be associated with Line 3; Position 40. The anomaly at Position 100 does not appear to be associated with another anomaly.

Line 3:

Line 3 is located 20 ft north of Line 2 and extends west to east between the pump island and a concrete foundation remnant (Figure 1-3). There are 2 sharp peaks in the magnetic signature on this line at Positions 40 and 100 (Figure 2-3). These Positions have been staked for further investigation. Line 3; Position 40 appears to be associated with the rise in signature on Line 2; Position 40 and should be investigated in association with this location.

Line 4:

Line 4 extends west to east directly through the foundation remnant. A rise in the signature at Position 0 appears to be associated with the rise in signature with Line 5; Position 20 (Figure 2-4). This location requires further investigation and should be investigated in the direction of Line 5; Positions 20 and 40.

Line 5:

Line 5 is located 20 ft north of Line 4 with Position 0 located on pavement and the rest of the locations on the grass covered area around the pump island. Due to a sharp increase in magnetic signature at Position 20, possibly associated with the rise in signature at Line 4; Position 0 (Figure 2-5). This location has been staked for further investigation.

Line 6:

Line 6 is located furthest north of the lines on this survey. Positions 0 and 20 are located on the pavement and all other locations were located on the grass. This line runs parallel to power lines. Although Positions 80 and 100 are located near transformers, the only position

that indicates further investigation is Position 40, which shows a slight increase in magnetic signature which may be associated with the rise on Line 5; Position 20 (Figure 2-6).

2.3.2 Survey South of Building E-107

Review of the magnetic signatures for the area south of Building E-107 indicate that the greatest anomaly observed during the survey was located at Line 3; Position 0, which could be attributed to the metal around the building or possibly something located within the building.

Examination of the TF measurements obtained near Building E-107 (Lines 1 through 3) indicate that further investigation is required for Line 1; Position 45 and Line 3; Position 0. These positions have been staked for further investigation.

Survey Findings

Line 1:

Line 1 is located along the road south of Building E-107 and trends from west to east. Each line of this survey was 90 ft long with magnetometer readings obtained every 15 ft. The magnetic signature of this line showed a marked decrease at Position 45. This position has been staked for further investigation.

Line 2:

Line 2 is located 15 ft north of Line 1. A sharp increase in the magnetic signature at Position 75 was attributed to a large metal pipe located in the road near this location. No points on this line were staked for further investigation.

Line 3:

Line 3 is located closest to Building E-107. There is a significant decrease in the magnetic signature at Position 0 and this location has been staked for further investigation.

3. SUMMARY AND CONCLUSIONS

3.1 PUMP ISLAND AREA

Review of pump island area magnetic signatures indicate that there is ferrous metal (possibly a tank) located in the area near the pump island between Line 2; Position 40 and Line 3; Position 40 (Figure 3-1). There are also strong anomalies located at Line 5; Position 20, Line 4; Position 0, and at Line 3; Position 100. These larger anomalies (over 1000 gammas) fall within the magnetic intensity ranges that would be expected for an underground storage tank (UST). Smaller anomalies (approximately 100 gammas or less) fell within the range that warrant further investigation and these locations were staked for that reason (Line 1; Position 80 and Line 6; Position 40).

The range of gamma readings were from 53,642 (Line 2; Position 120) to 56,465 (Line 5; Position 20), with an average reading of 54,137 with a variation of 2823 gammas observed during the site survey.

3.2 BUILDING E-107

Review of Building E-107 area magnetic signatures indicate that there is ferrous metal located near the building at Line 3; Position 0 (Figure 3-2). This anomaly could be attributed to metal located within the building and the building interior should be inspected prior to excavation at this location. There is also a strong anomaly located at Line 1; Position 45. These larger anomalies (over 1000 gammas) fall within the magnetic intensity ranges that would be expected for an underground storage tank (UST).

The range of gamma readings were from 45,577 (Line 3; Position 0) to 55,628 (Line 2; Position 75), with an average reading of 52,156 with a variation of 10,051 gammas observed during the site survey.

EA Engineering, Science, and Technology. 1995. *Final Basewide Environmental Baseline Survey, NCBC Davisville, RI*. October.

Halliburton NUS Corporation. 1992. *UST Remedial Investigation Report, NCBC Davisville, RI*. Northern Division Naval Facilities Engineering Command, Contract No. N62472-90-D1298. December.

TRC Environmental Corporation, Inc. 1991. *Phase I Remedial Investigation and Risk Assessment, Naval Construction Center, Davisville, Rhode Island*. Final Report. Prepared for U.S. Navy Northern Division Naval Facilities Engineering Command, Philadelphia, PA. May.

TABLE 1
EBS REVIEW ITEM 28
PUMP ISLAND AREA MAGNETOMETER SURVEY
NCBC DAVISVILLE

Date: June 3, 1997

Time: started at 1030 hrs., ended at 1120 hrs.

Line Number	Position	Total Field in Gammas	Visual Debris / Comments
1	0	53,853	along trees/bushes
1	20	53,820	
1	40	53,809	
1	60	53,907	
1	80	53,946	
1	100	53,866	
1	120	53,833	near boats
2	0	53,848	
2	20	53,825	approaching pump island
2	40	54,959	near pump island
2	60	54,113	near pump island
2	80	53,899	
2	100	53,751	
2	120	53,642	near boats
3	0	53,909	
3	20	55,034	approaching pump island
3	40	56,040	near pump island
3	60	53,852	near pump island
3	80	53,885	
3	100	55,456	
3	120	53,659	near boat (about 50 ft away)
4	0	55,139	
4	20	53,816	
4	40	54,067	in foundation remnant

Line Number	Position	Total Field in Gammas	Visual Debris / Comments
4	60	53,714	
4	80	53,744	
4	100	53,739	
4	120	53,829	
5	0	55,453	
5	20	56,465	near power lines
5	40	55,059	near power lines
5	60	53,822	
5	80	53,848	
5	100	53,740	
5	120	53,870	near boat
6	0	53,945	line 6 is closest to power lines
6	20	53,997	
6	40	54,059	
6	60	53,850	
6	80	53,865	near transformers (about 40 ft away)
6	100	53,864	near transformers (about 40 ft away)
6	120	53,869	boat about 50 ft away

TABLE 2
EBS REVIEW ITEM 28
BUILDING E-107 MAGNETOMETER SURVEY
NCBC DAVISVILLE

Date: June 3, 1997

Time: started at 1540 hrs., ended at 1615 hrs.

Line Number	Position	Total Field in Gammas	Visual Debris / Comments
1	0	52,789	
1	15	52,830	
1	30	52,851	
1	45	51,771	
1	60	53,944	on asphalt
1	75	53,832	4 ft from dumpster
1	90	54,266	6 ft from dumpster
2	0	52,101	
2	15	51,384	near metal buoys
2	30	50,675	
2	45	50,800	
2	60	51,981	
2	75	55,628	near pipe in road
2	90	51,940	
3	0	45,577	line 3 is along bldg, lots of metal (see photos)
3	15	52,156	
3	30	51,980	
3	45	52,093	
3	60	52,035	near flag pole and shed
3	75	51,886	
3	90	52,755	

WESTCOTT ROAD

ASPHALT - PAVED ROAD

EBS-28-SB-01
EBS-28-SB-02
EBS-28-SB-04
EBS-28-SB-03

AREA SUSPECTED FOR CREOSOTE DIPPING ACTIVITIES

BERMED WOODEN
STRUCTURE

P-GU-24-9 S/D



WOODEN PILINGS

CONCRETE RAMP

ASPHALT
PAVED AREA
SUSPECTED FIRE TRAINING AREA
APPROX. 136 FT X 76 FT

ASPHALT PAVED AREA

TREE

PUMP ISLAND

FOUNDATION REMAINS

MAGNETIC SURVEY
PUMP ISLAND AREA

ROAD

TREE

100 FT

GRASS AREA

30 FT
90 FT

E107

MAGNETIC SURVEY

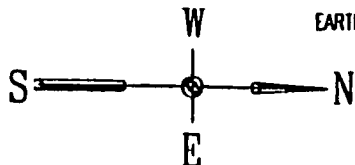
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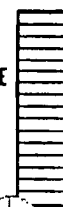
MAGNETIC SURVEY



EXISTING PIEZOMETER
SOIL BORING LOCATION



EARTH RAMP STRUCTURE



SITE SKETCH

REVIEW ITEM 28
CREOSOTE DIP AREA

NORTHERN DIVISION NAVAL FACILITY
PHASE III EBS FOLLOW-ON INVESTIGATION
NCBC DAVISVILLE, RHODE ISLAND

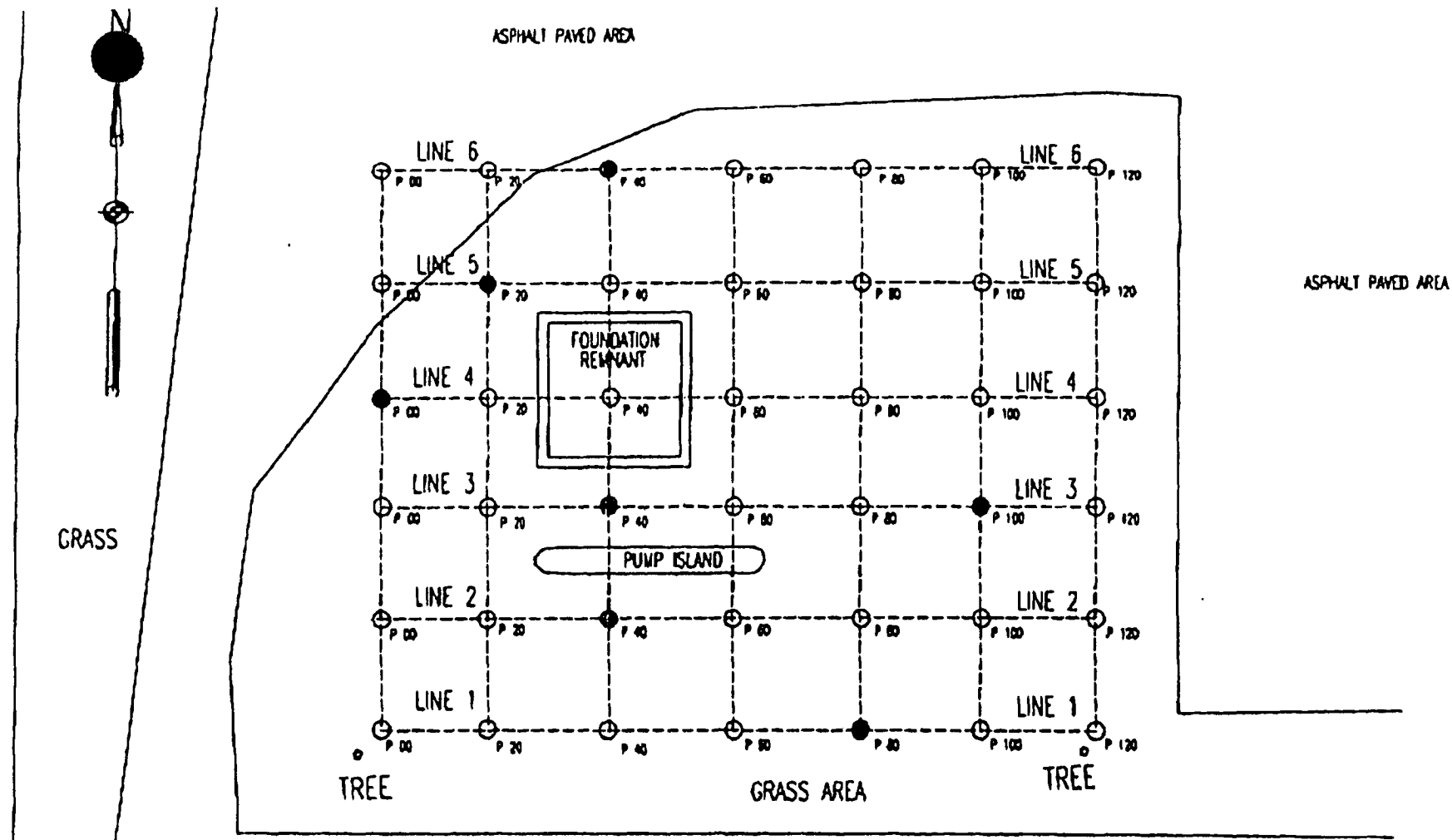
DATE 6/6/97
DESIGNED BY KWC
DRAWN BY RWC
CHECKED BY JC
PROJECT MANAGER JC



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY

3 CONVENT ROAD, 27
DUNELAND, NJ 07007
(917) 704-1707

PROJECT NUMBER 29600.60
SCALE NOT TO SCALE
FILE NAME RLVE107
DATE 6/6/97
SCALE 1-2



F:\PROJECTS\29800.60\7777\FIG1-3.DWG

GRASS

WESTCOTT ROAD

LEGEND:

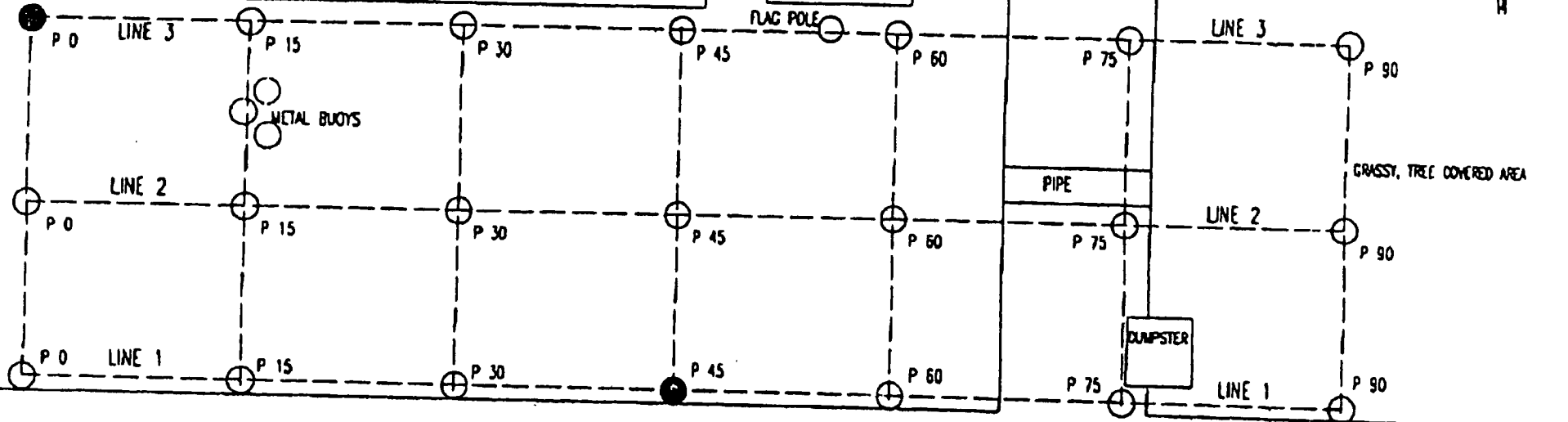
● LOCATION OF MAGNETIC ANOMALY REQUIRING FURTHER INVESTIGATION

<p align="center">SITE SKETCH REVIEW ITEM 28 MAGNETOMETER SURVEY PUMP ISLAND AREA NORTHERN DIVISION NAVAL FACILITY PHASE II EBS FOLLOW-ON INVESTIGATION NCBC DAVISVILLE, RHODE ISLAND</p>				
DATE	6/4/97	<p>EA ENGINEERING, SCIENCE, AND TECHNOLOGY</p> <p>1 CONSTRUCTION SET 0/175 780-1187</p>	PROJECT NUMBER	29800.60
DESIGNED BY	RWC		SHEET	NOT TO SCALE
DRAWN BY	RWC		FILE NAME	FIG1-3
CHECKED BY	JC		SHEET NO.	
PROJECT MANAGER	JC		FIGURE NUMBER	1-3

BUILDING E-107

SHED

ALLEN HARBOR



ROAD

LEGEND:

● LOCATION OF MAGNETIC ANOMALY
REQUIRING FURTHER INVESTIGATION

SITE SKETCH

REVIEW ITEM 28
MAGNETOMETER SURVEY BUILDING E-107

NORTHERN DIVISION NAVAL FACILITY
PHASE II EBS FOLLOW-ON INVESTIGATION
NCBC DAVISVILLE, RHODE ISLAND

DWG 6/4/97

DESIGNED BY RWC

DRAWN BY RWC

CHECKED BY JC

PROJECT MANAGER JC



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY

2 CONSTRUCTION
SHEET OF 2000
8/7/97 201-1111

PROJECT NUMBER
79600.60

SCALE
NOT TO SCALE

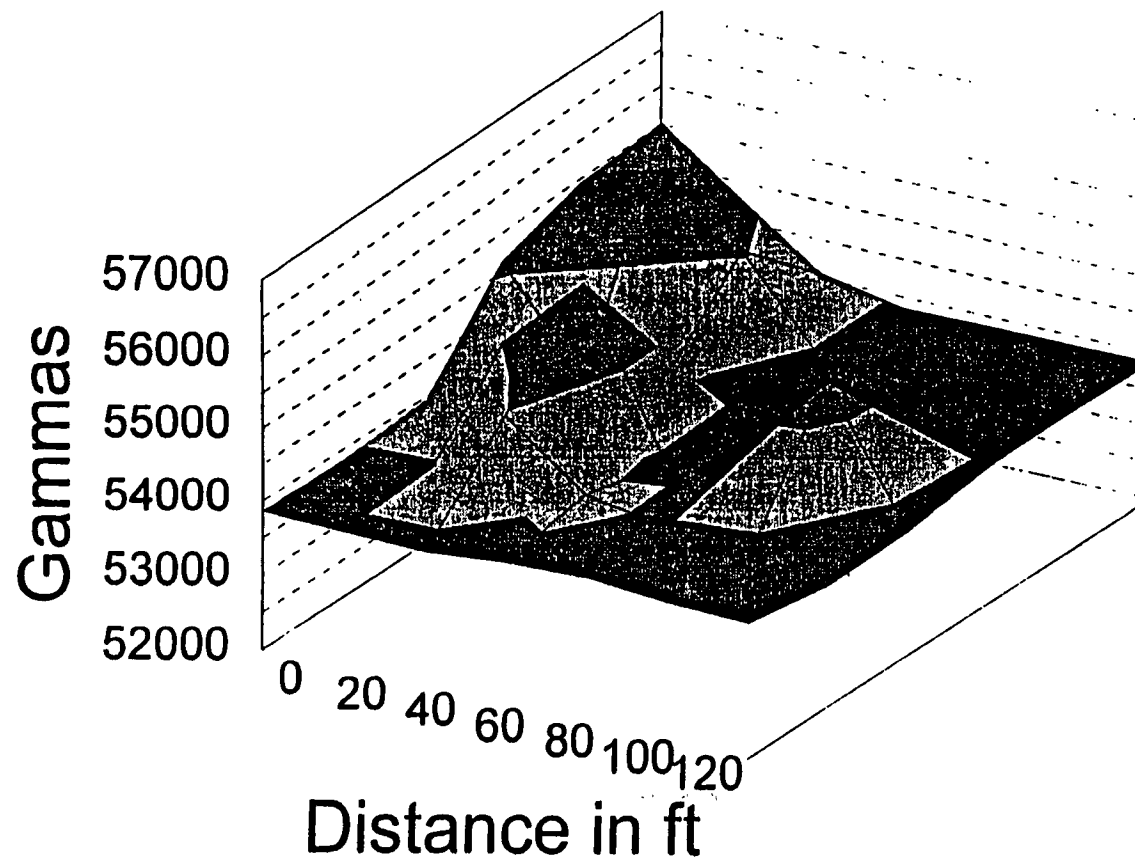
FILE NAME
FIG1-4

DATE
1-4

FIGURE NUMBER
1-4

Magnetometer Survey

Pump Island Area



Magnetometer Survey Data

Pump Island Area, Line 1

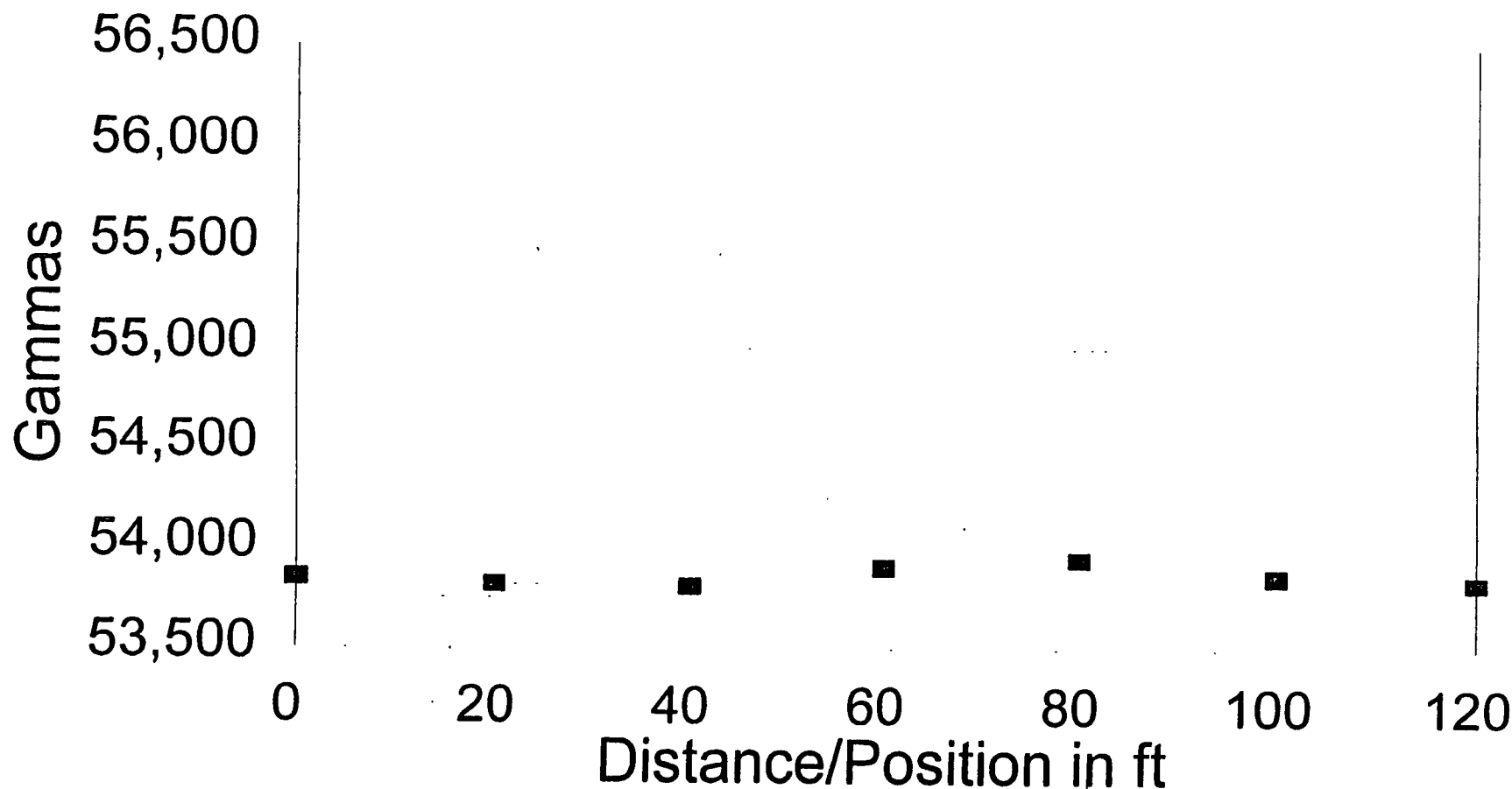
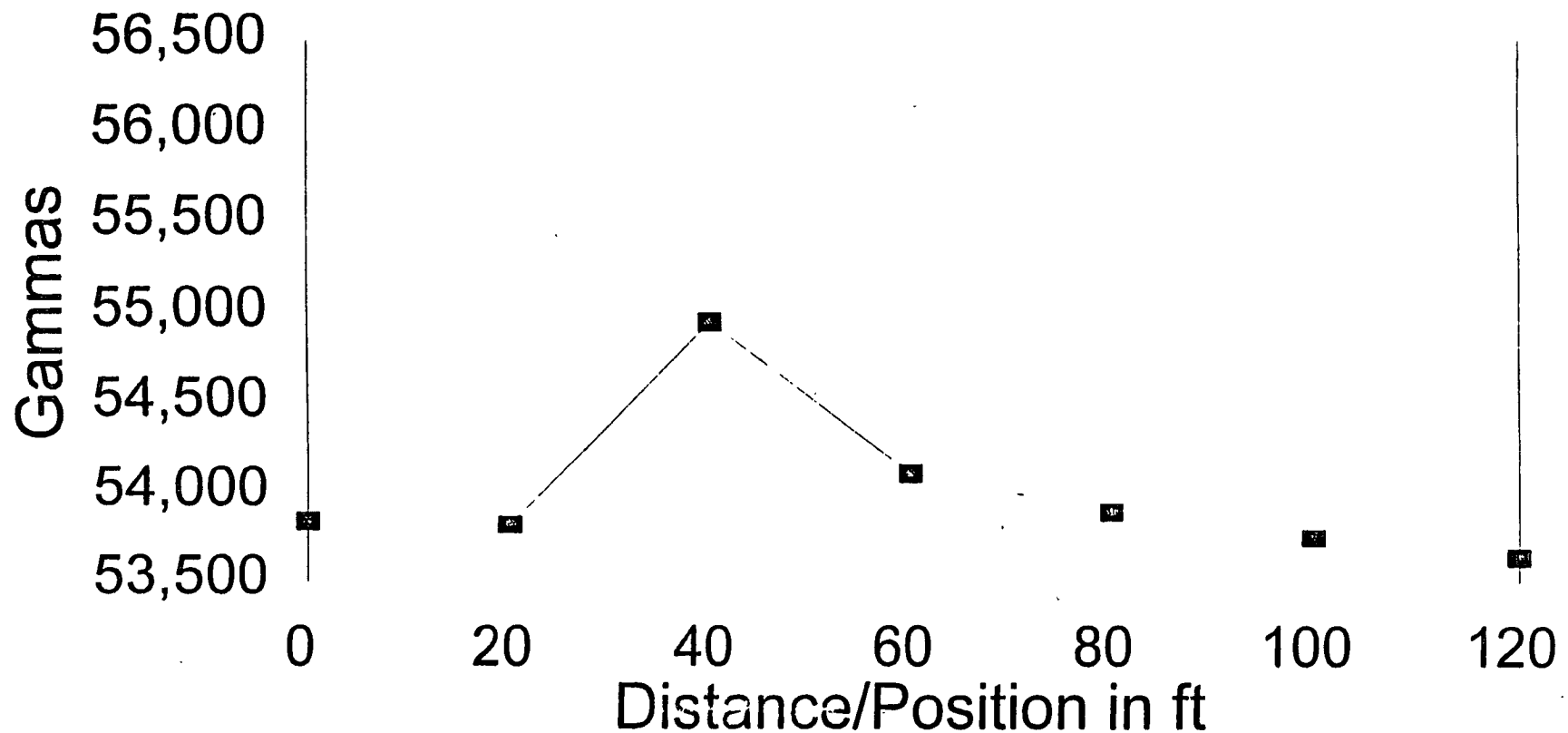
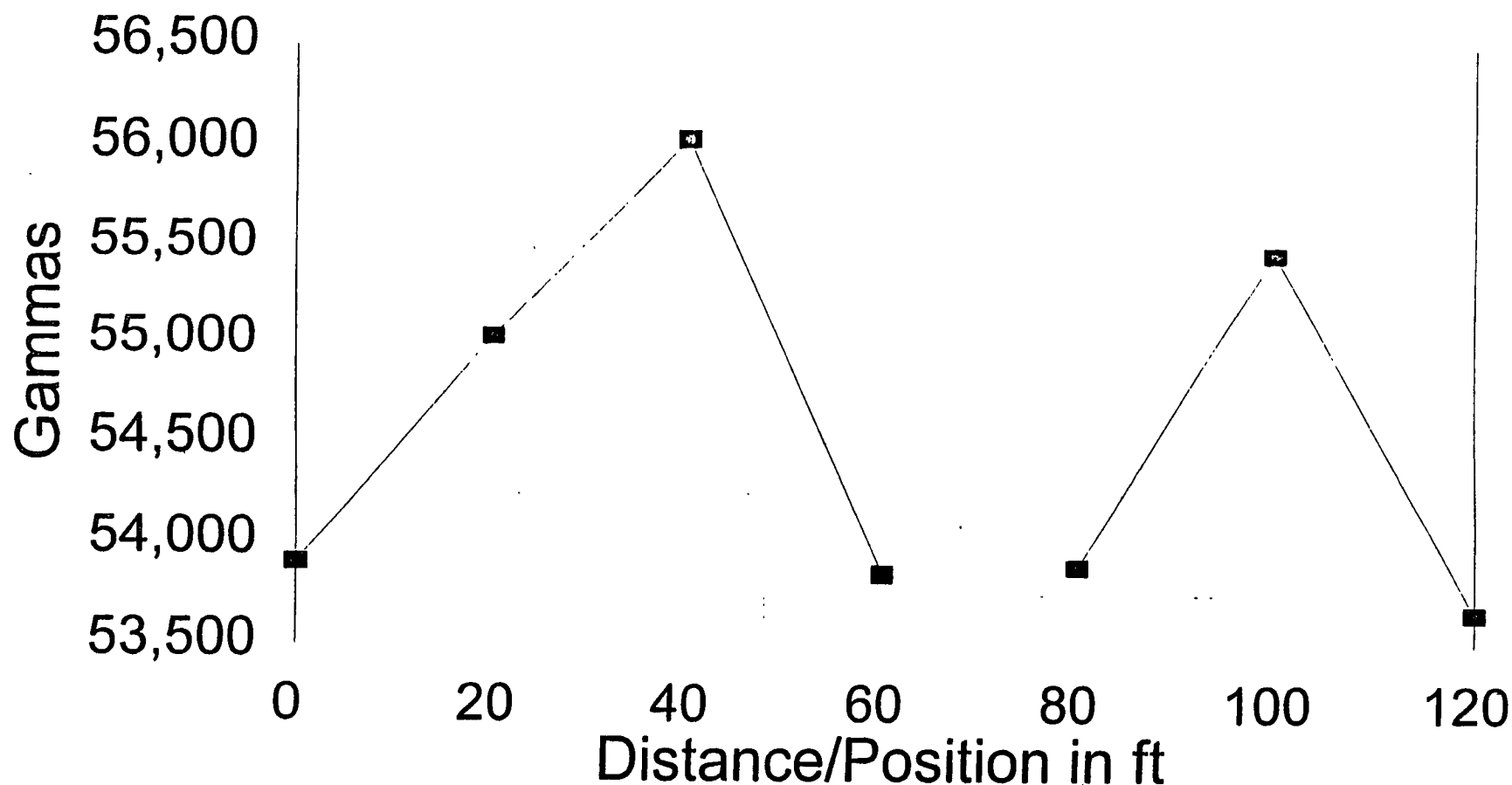


FIGURE 2-2: Magnetometer Survey Data
Pump Island Area, Line 2



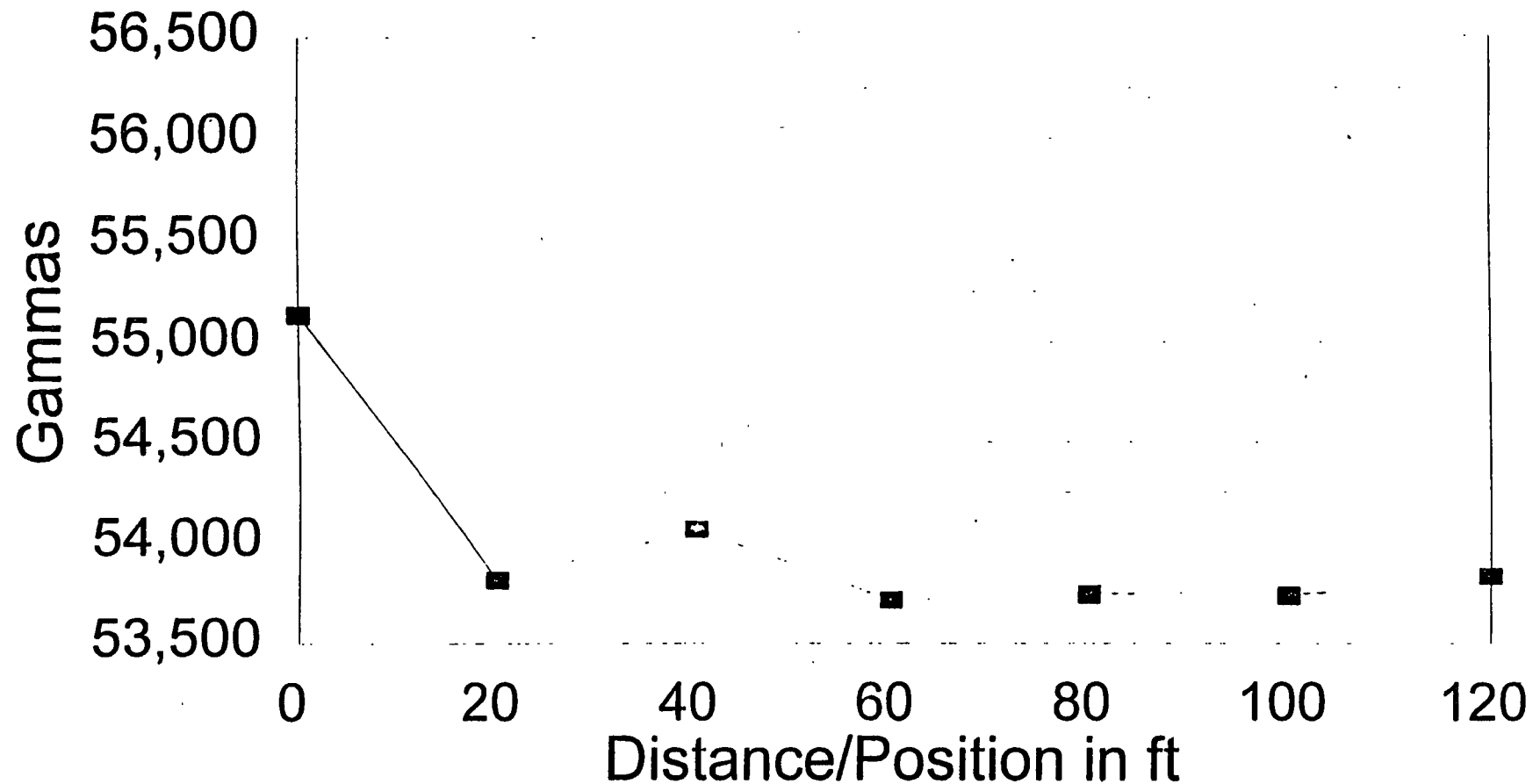
Magnetometer Survey Data

Pump Island Area, Line 3



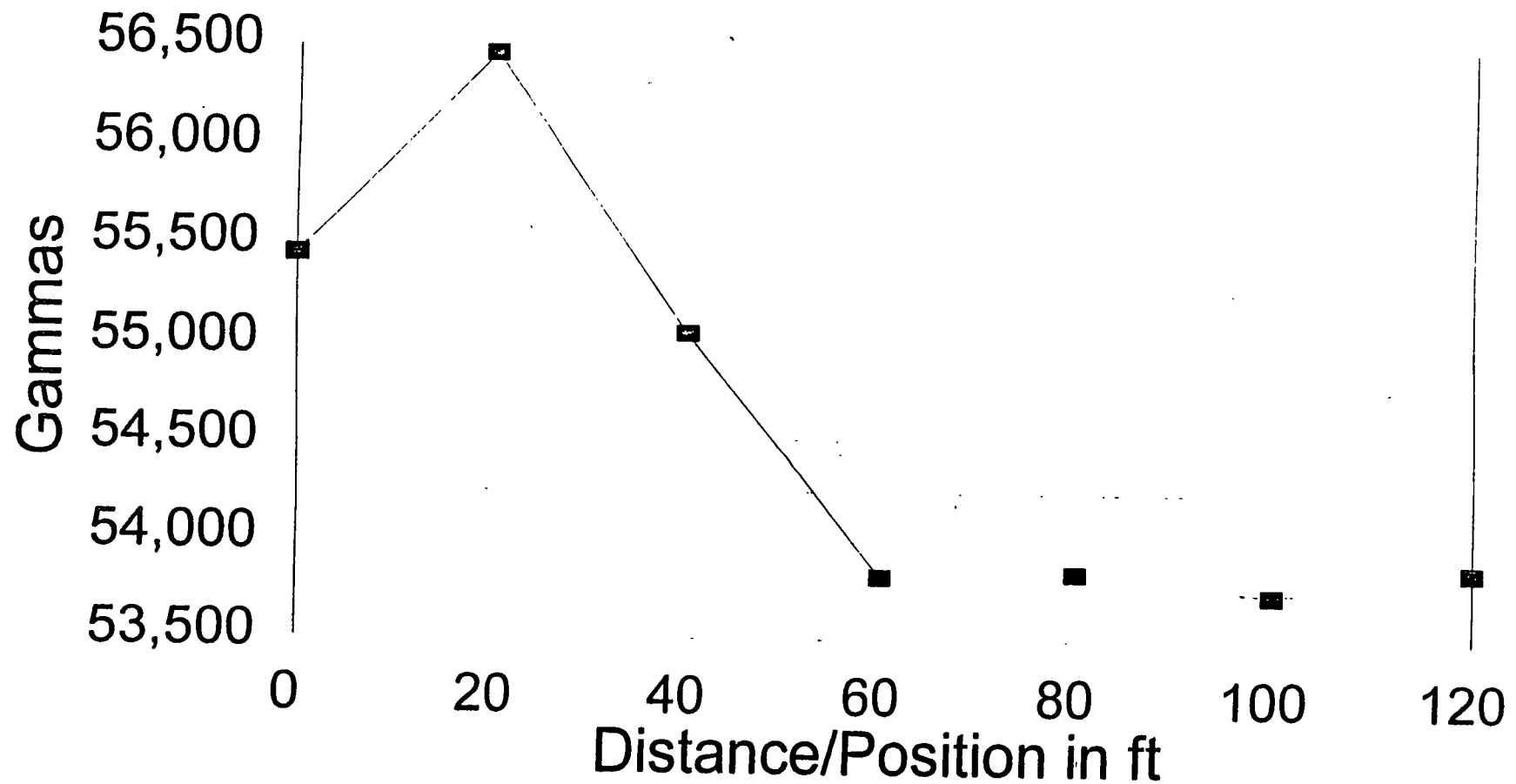
Magnetometer Survey Data

Pump Island Area, Line 4



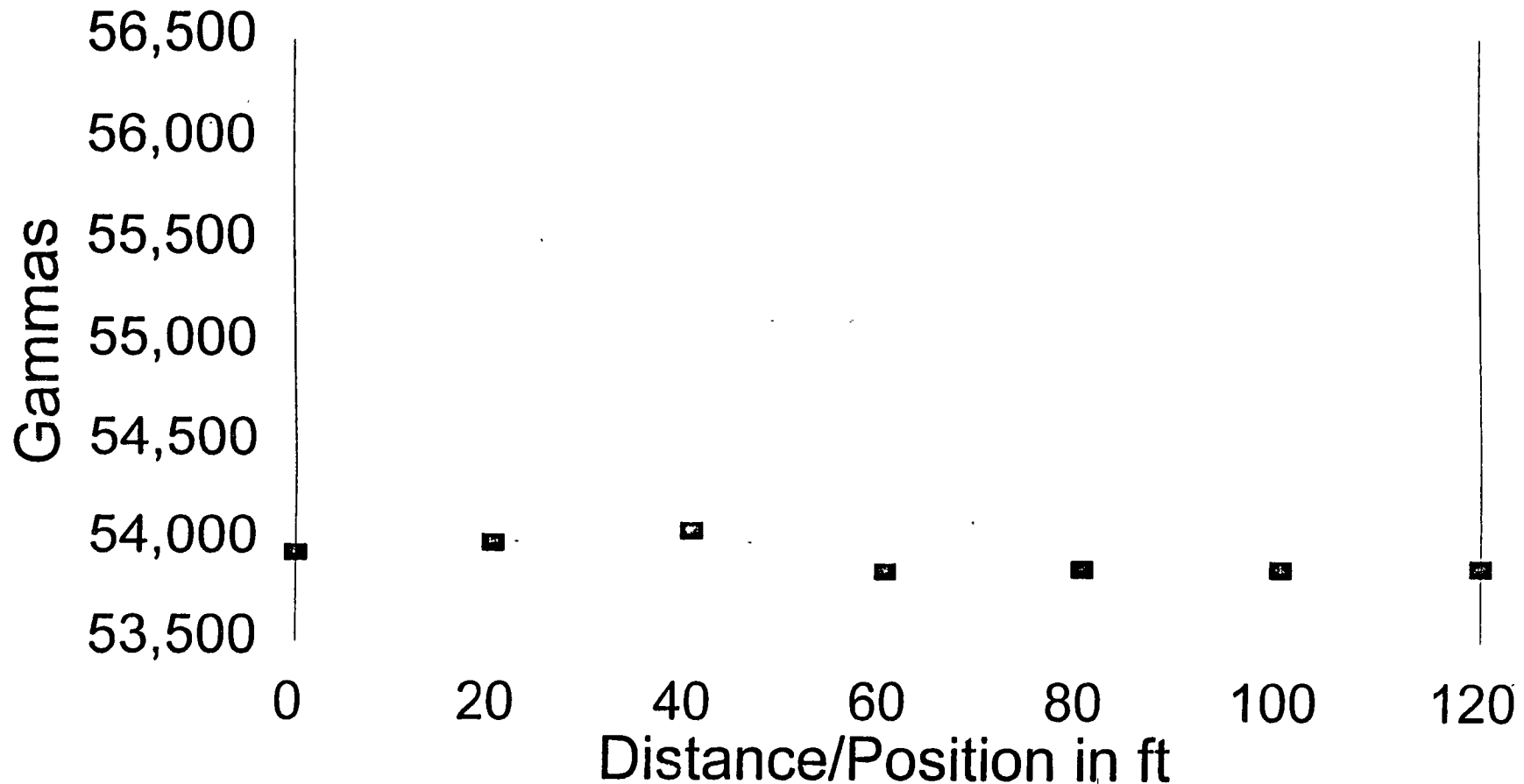
Magnetometer Survey Data

Pump Island Area, Line 5



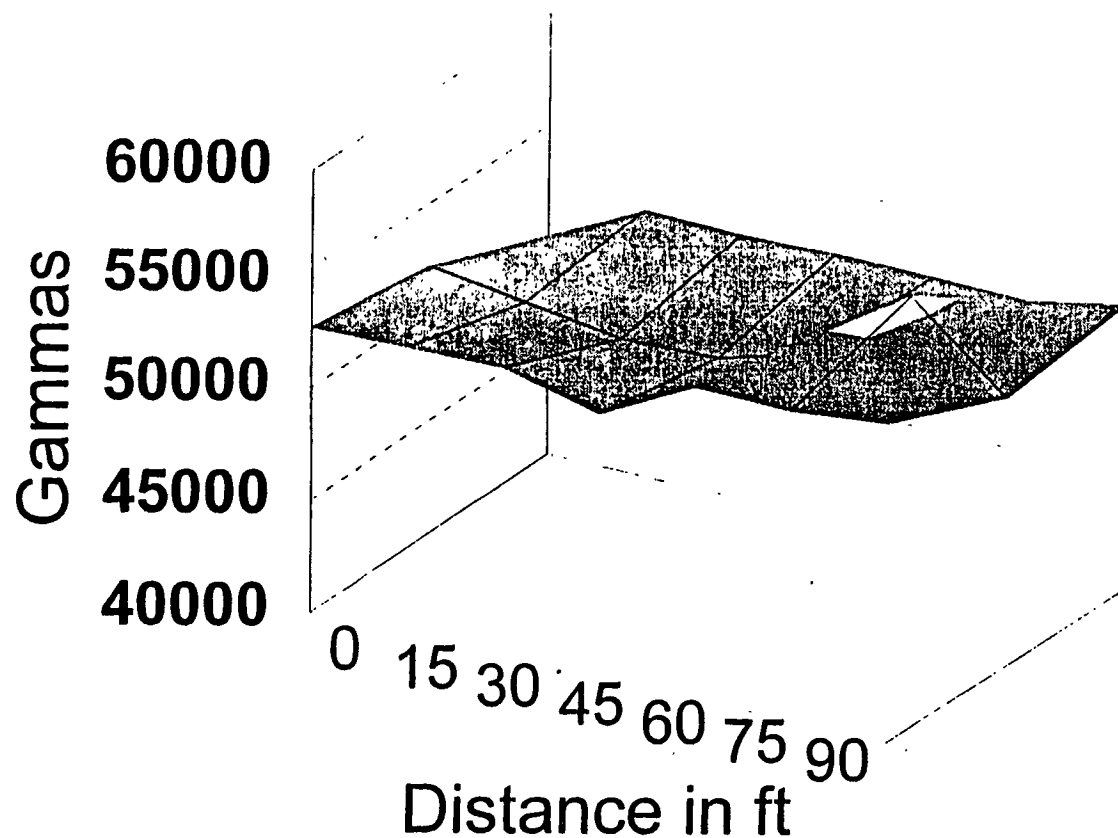
Magnetometer Survey Data

Pump Island Area, Line 6



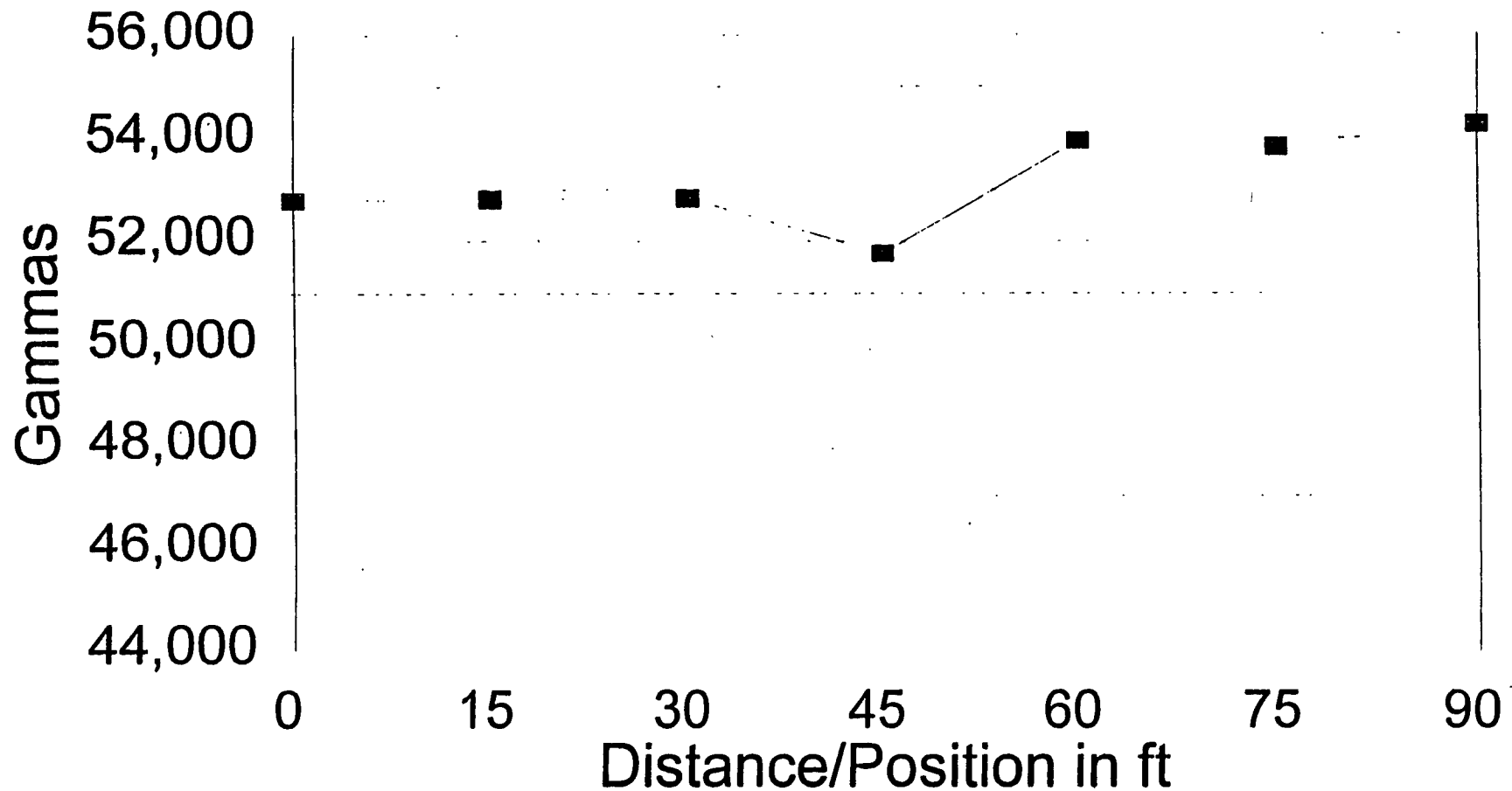
Magnetometer Survey

Building E-107



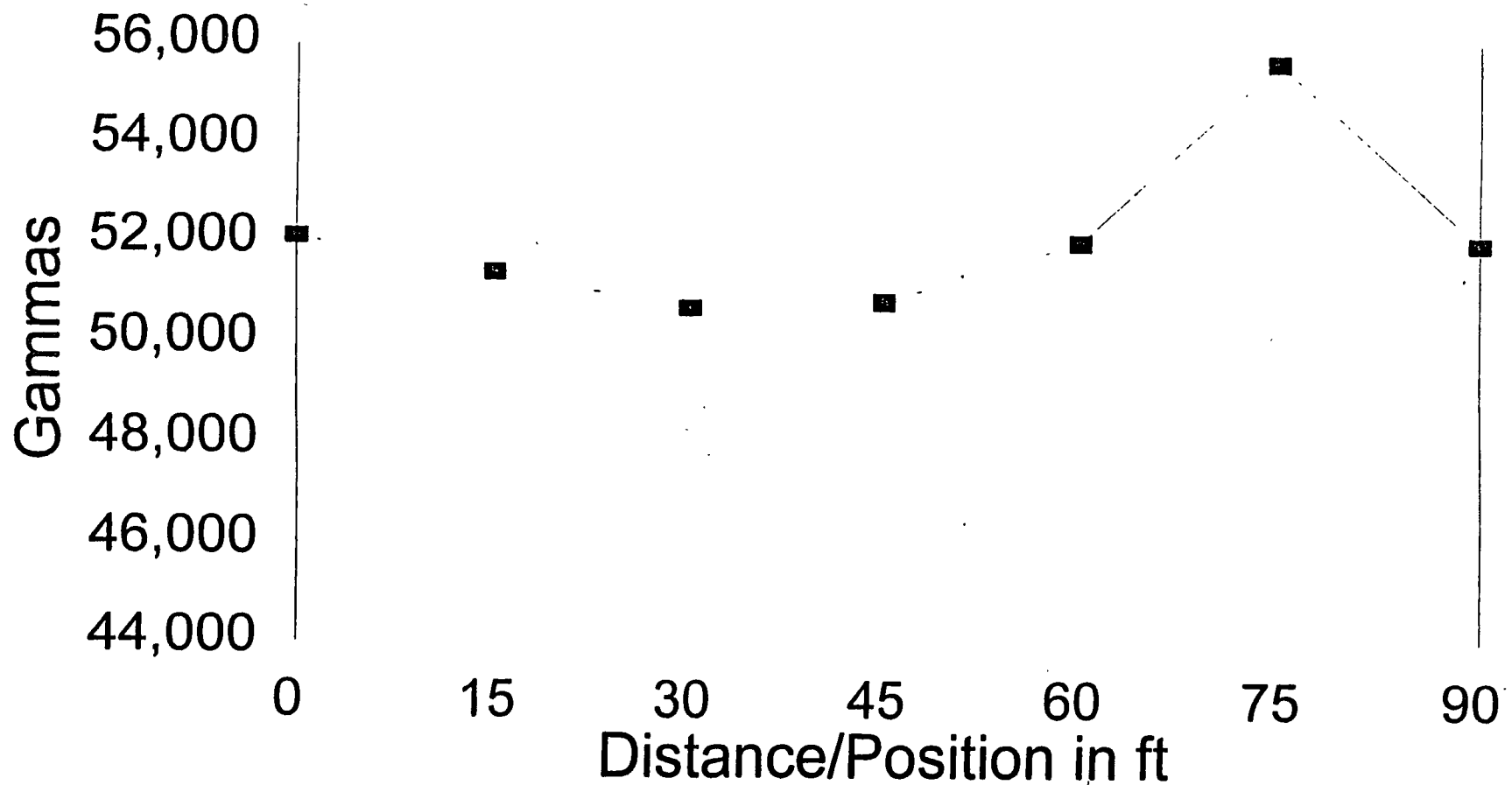
Magnetometer Survey Data

Building E-107, Line 1



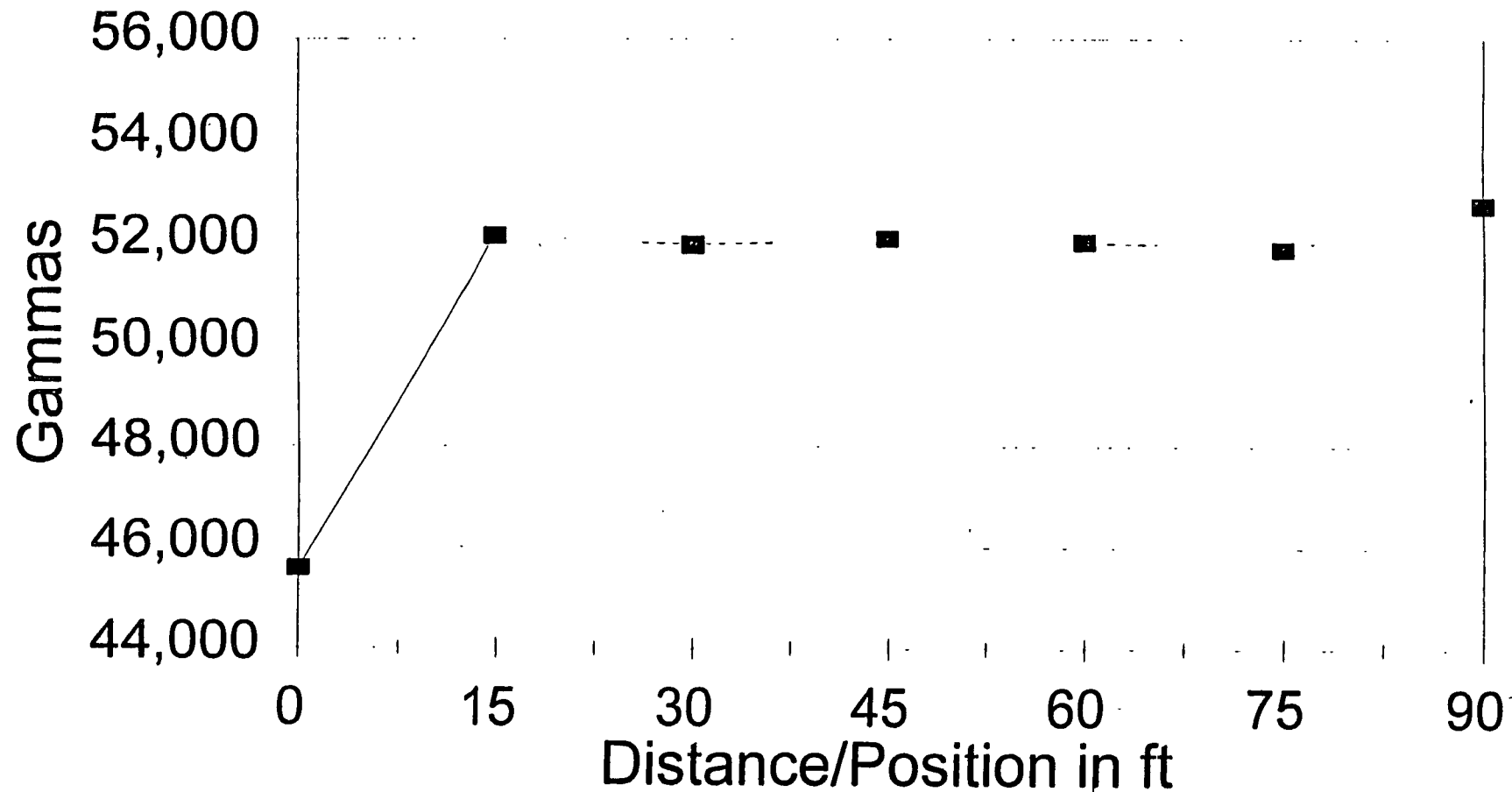
Magnetometer Survey Data

Building E-107, Line 2



Magnetometer Survey Data

Building E-107, Line 3



Appendix B-3

Review Item 28 (UST Area)

Test Pit Logs and Analytical Report (FWENC)

Review Item 28 (UST Area)
Summary of Test Pit Logs (FWENC)

Grid Location	Dimensions	Comments	Sample
P-45-0 (south of Building E-107)	15 ft long (6 ft 8 in. at the bottom) × 2 ft 6 in. × 6 ft 2 in.	A wood chip layer was identified at 5 ft bgs. Wood debris and lifting cables were identified at 6 to 8 ft bgs. The wood chips were visibly stained with petroleum and a petroleum odor was noted and the material was sampled. A jar headspace PID measurement of a sample from the wood chip layer was 35 ppm.	EBS28-P45
P-0-3 (south of Building E-107, near metal debris, i.e., metal boat stands and metal buoys)	15 ft (6 ft 8 in. at the bottom) × 2 ft 6 in. × 6 ft 7 in.	No debris was found. A petroleum odor was noted. A jar headspace PID measurement of a sample from was 15 ppm.	EBS28-P03
P-80-1 (south of pump island)	15 ft (6 ft 8 in. at the bottom) × 2 ft 6 in. × 7 ft	No debris was found. TPH was non-detect from a field screening with a PetroFlag kit.	None
P-40-2 (south of pump island)	15 ft (6 ft 8 in. at the bottom) × 2 ft 6 in. × 6 ft	No debris was found. The test pit was located adjacent to the pump island. The concrete was noted to be reinforced with rebar. A field screening of soil samples with a PetroFlag kit had a detected TPH concentration of 326 ppm.	EBS28-P40-2
P-40-3 (north of pump island)	15 ft (6 ft 8 in. at the bottom) × 2 ft 6 in. × 6 ft 2 in	No debris was found. Metal pipes exiting the pump island slab were noted near the test pit location. The concrete is reinforced with rebar. TPH was non-detect from a field screening with a PetroFlag kit.	None
P-00-4 (northwest of pump island)	15 ft (6 ft 8 in. at the bottom) × 2 ft 6 in. × 6 ft	No debris was found. Some large rocks and some ledge was encountered. TPH was non-detect from a field screening with a PetroFlag kit.	None
P-20-5 (northwest of pump island)	15 ft (6 ft 8 in. at the bottom) × 2 ft 6 in. × 6 ft	No debris was found. An old asphalt layer and some large rocks were encountered. TPH was non-detect from a field screening with a PetroFlag kit.	None
P-40-6 (north of pump island)	15 ft (6 ft 8 in. at the bottom) × 2 ft 6 in. × 6 ft 8 in.	No debris was found. Bedrock was encountered at 2 ft bgs and the test pit was relocated 3 ft to the north. A field screening of a sample with a PetroFlag kit had a detected TPH concentration of 5 ppm.	None
P-100-3 (east of pump island)	15 ft (6 ft 8 in. at the bottom) × 2 ft 6 in. × 6 ft 2 in.	No debris was found. TPH was non-detect from a field screening of samples with a PetroFlag kit.	None

FOSTER WHEELER ENVIRONMENTAL CORPORATION

TO: Jane Connet

FROM: Tricia Sumner 

DATE: August 5, 1997

RE: Review Item 28 - Test Pitting

Review Item 28 Test Pitting Log

Grid Location	Excavation Size	Excavation Direction	Test Pit Findings	Sampling Information
P-45-0	15' long at surface 6-8' long at bottom of excavation 2'6" wide 6'2" deep	East to West	Wood Chip Layer at 5'; Wood Debris and Lifting Cables at 6-8'. Wood Chips were visibly stained with petroleum, petroleum odor noted.	Jar Head Space with PID: 35 ppm (of wood chip layer) Petroleum Odor Noted. Sample sent to Lab for analysis of TPH 418.1, 8015M, SVOC and VOC.
P-0-3	15' long at surface 6-8' long at bottom of excavation 2'6" wide 6'7" deep	North to South	No Debris found. This test pit location is near Bldg E- 107 and is located near metal debris (i.e. metal boat stands and metal buoys)	Jar Head Space with PID: 15 ppm Petroleum Odor Noted. Sample sent to Lab for analysis of TPH 418.1, 8015M, SVOC and VOC.
P-60-1	15' long at surface 6-8' long at bottom of excavation 2'6" wide 7' deep	North to South	No Debris found.	Field Screening with PetroFlag Kits for TPH: 0 ppm
F-40-2	15' long at surface 6-8' long at bottom of excavation 2'6" wide 6' deep	East to West	No Debris found. Test pit location is adjacent to pump island. Concrete is reinforced with rebar.	Field Screening with PetroFlag Kits for TPH: 326 ppm Sample sent to Lab for analysis of TPH 418.1, 8015M, SVOC and VOC.
40-3	15' long at surface 6-8' long at bottom of excavation 2'6" wide 6' 2" deep	East to West	No Debris Found. Metal pipes exiting pump island slab noted near test pit location. Test pit location is adjacent to pump island. Concrete is reinforced with rebar.	Field Screening with PetroFlag Kits for TPH: 0 ppm
P-00-4	15' long at surface 6-8' long at bottom of excavation 2'6" wide 6' deep	North to South	No Debris Found. Large Rocks and Some Ledge encountered.	Field Screening with PetroFlag Kits for TPH: 0 ppm
20-5	15' long at surface 6-8' long at bottom of excavation 2'6" wide 6' deep	North to South	No Debris Found. Old asphalt layer and some large rocks encountered.	Field Screening with PetroFlag Kits for TPH: 0 ppm
40-6	15' long at surface 6-8' long at bottom of excavation 2'6" wide 6'5" deep	East to West	No Debris Found. Ledge encountered at 2'. Moved test pit location 3' to the North to dig test pit to depth.	Field Screening with PetroFlag Kits for TPH: 5 ppm
100-3	15' long at surface 6-8' long at bottom of excavation 2'6" wide 6' deep	East to West	No Debris Found.	Field Screening with PetroFlag Kits for TPH: 0 ppm

SITE ADDRESS: 1446 DAVISVILLE ROAD, NORTH KINGSTOWN, RI 02852
TEL: 401-294-6605 FAX: 401-294-9122

175 Metro Center Boulevard • Warwick, Rhode Island 02886-1755

(401) 732-3400 Fax (401) 732-3499

1232 East Broadway Road, Suite 210 • Tempe, Arizona 85282

(602 303-9535 Fax (602) 921-2883

CHAIN-OF-CUSTODY RECORD

Page 1 of 1[illegible]

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Review Item 28 (UST Area)
Summary of Test Pit Analytical Data (FWENC)

SAMPLE ID	EBS28-P-45		EBS28-P40-2		EBS28-P-0-3	
ANALYTE	CONC	Q	CONC	Q	CONC	Q
TPH						
TPH by 418.1 (mg/kg)	100		170		88	
TPH GRO (µg/kg)	ND		ND		ND	
VOC (µg/kg)						
Acetone	560	D	11		22	
Xylenes	12		ND		ND	
SVOC (µg/kg)						
Acenaphthylene	19,000	J	ND		ND	
Acenaphthene	210,000	D	ND		ND	
Dibenzofuran	220,000		ND		ND	
Fluorene	210,000		ND		ND	
Phenanthrene	570,000		ND		ND	
Anthracene	840,000		ND		ND	
Carbazole	210,000		ND		ND	
Fluoranthene	2,300,000	D	ND		ND	
Pyrene	2,800,000		ND		ND	
Benzo(a)anthracene	610,000	D	ND		ND	
Chrysene	220,000	D	ND		ND	
Benzo(b)fluoranthene	210,000	D	ND		ND	
Benzo(k)fluoranthene	220,100		ND		ND	
Benzo(a)pyrene	210,000	D	ND		ND	
Indeno(1,2,3-cd)pyrene	72,000		ND		ND	
Benzo(g,h,i)perylene	68,000		ND		ND	
Pesticides/PCB (µg/kg)						
Dieldrin	0.1		ND		ND	
Endosulfan II	220		ND		ND	
4,4'-DDT	ND		7.6		ND	
Metals (mg/kg)						
Arsenic	ND		3		3	
Barium	9		13		8	
Cadmium	ND		ND		0.1	
Chromium	2		8		6	
Lead	6		8		6.9	
Selenium	5		ND		ND	

Shaded blocks indicate concentrations above RIDEM Ind./Com. Direct Soil Exposure or DAF 20 criteria.

NA = not analyzed

ND = not detected

J = estimated

D = dilution sample result

Evaluation of FWENC's test pit analytical data was as follows:

- In sample EBS28-P-0-3, TPH, acetone, and various metals were detected. The concentrations of these analytes did not exceed RIDEM's Industrial/Commercial Direct Soil Exposure criteria or DAF-20 criteria. Only arsenic and chromium exceeded RIDEM's Residential Direct Soil Exposure criteria or DAF-1 criteria; however, these concentrations were within background levels. TPH-GRO, SVOC, pesticides, and PCB were not detected in this sample.
- In sample EBS28-P40-2, TPH, acetone, 4,4'-DDT, and various inorganics were detected. The concentrations of these analytes did not exceed RIDEM's Industrial/Commercial Direct Soil Exposure criteria or DAF-20 criteria. Only arsenic and chromium exceeded RIDEM's Residential Direct Soil Exposure criteria or DAF-1 criteria; however, these concentrations were within background levels. TPH-GRO, SVOC, and PCB were not detected in this sample.
- In sample EBS28-P-45, TPH, acetone, xylenes, dieldrin, endosulfan II, and various SVOC and metals were detected. TPH-GRO and PCB were not detected in this sample. The concentration of TPH exceeded the RIDEM Industrial/Commercial Direct Soil Exposure and the RIDEM Class GB Leachability criteria. The concentrations of the two VOC compounds were below the screening criteria. Nine of sixteen detected SVOC exceeded the DAF-20 criteria and, of these, five also exceeded the RIDEM Industrial/Commercial Direct Soil Exposure criteria [benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene]. A RIDEM Direct Soil Exposure Criterion is not available for dibenzofuran; however, the concentration of this analyte exceeded the Region IX EPA Industrial RBC. Of the six remaining SVOC that did not exceed these criteria, five of these exceeded the RIDEM Residential Direct Soil Exposure criteria and/or DAF-1 criteria. For pesticides, the concentration of Dieldrin exceeded its DAF-20 criterion as well as its RIDEM Residential Direct Soil Exposure Criterion. Endosulfan II was below the screening criteria. The concentrations of metals were below the screening criteria except for selenium, which only exceeded its DAF-1 criterion.

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CHAIN-OF-CUSTODY RECORD

Page 1 of 1[illegible]

WHITE: LABORATORY COPY

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PINK: CLIENTS COPY

PINK: CLIENT'S COPY

MITKEM CORPORATION

Lab Project #: **D1215**
 Client Name: **Foster Wheeler**
 Client Proj #: **1284-0006**
 Client PO #: **000620**
 Project Name: **Davidsville**
 Date Due: **8/13/97**
 Total Price: **\$**
 Project Mgr: **BAI**
 Salesman: **PAS**
 Est. Req'd: **NA**
 Completed?: **YES**

Logged In By: MAN

Reviewed By: _____

Date: 8/16/97 Time: 3:57

Lab ID	Client ID	Matrix	Analysis	Price	Sampled	Received	TPH	IR	BNA	Herb	P/P	Wet	Met	V-GC	V-MS	Sub
1	DV-EBS28-PO3	SL	Pest/PCB by 8080 RCRA 8 Metals		7/31/97	7/31/97					1		1			
12	DV-EBS28-P45	SL	Pest/PCB by 8080 RCRA 8 Metals		7/31/97	7/31/97					1		1			
13	DV-EBS28SSP40-2	SL	Pest/PCB by 8080 RCRA 8 Metals		7/31/97	7/31/97					1		1			

TPH	IR	BNA	Herb	P/P	Wet	Met	V-GC	V-MS	Sub
0	0	0	0	3	0	3	0	0	0

NOTES: 1) Samples were previously D1184-01, D1184-02, and D1191-01.

ORIGINAL REPORT GOES TO:
 Foster Wheeler Environmental Corp.
 70 Atlantic Avenue
 Boston, MA 02210

Attn: Dave Peterson
 Phone: 617-457-8200
 Fax: 617-457-8498

INVOICE GOES TO:

Foster Wheeler Environmental Corp.
 2300 Lincoln Hwy East, One Oxford Valley
 Langhorne, PA 19047

Attn: Rita Lee

8/6/97 11 PM



Analysis Report: Organochlorine Pesticides

Client: Foster Wheeler Environmental Corp.
Client ID: DV-EBS28-P03
Lab ID: D1215-01
Analysis: Method 8080

Analysis Date: 8/12/97
Matrix: Soil, 89% solids
Concentration in: ug/kg, dry weight basis
Dilution: 1

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
alpha-BHC	ND	1.9
gamma-BHC	ND	1.9
Heptachlor	ND	1.9
Aldrin	ND	1.9
beta-BHC	ND	1.9
delta-BHC	ND	1.9
Heptachlor epoxide	ND	1.9
Endosulfan I	ND	1.9
4,4'-DDE	ND	3.8
Dieldrin	ND	3.8
Endrin	ND	3.8
4,4'-DDO	ND	3.8
Endosulfan II	ND	3.8
4,4'-DDT	ND	3.8
Endrin aldehyde	ND	3.8
Methoxychlor	ND	19
Endosulfan sulfate	ND	3.8
Chlordan (technical)	ND	96
Toxaphene	ND	190
Aroclor-1016	ND	38
Aroclor-1221	ND	76
Aroclor-1232	ND	38
Aroclor-1242	ND	38
Aroclor 1248	ND	38
Aroclor-1254	ND	38
Aroclor-1260	ND	38

QC Batch: P0811-B1

Surrogate Recovery:

2,4,5,6-Tetrachloro-m-xylene	83%
Decachlorobiphenyl	103%

ND = Not detected

**Analysis Report: Organochlorine Pesticides****Client:** Foster Wheeler Environmental Corp.**Client ID:** DV-EBS28-P45**Lab ID:** D1215-02**Analysis:** Method 8080**Analysis Date:** 8/12/97**Matrix:** Soil, 42% solids**Concentration in:** ug/kg, dry weight basis**Dilution:** 10

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
alpha-BHC	ND	40
gamma-BHC	ND	40
Heptachlor	ND	40
Aldrin	ND	40
beta-BHC	ND	40
delta-BHC	ND	40
Heptachlor epoxide	ND	40
Endosulfan I	ND	40
4,4'-DDE	ND	81
Dieldrin	94	81
Endrin	ND	81
4,4'-DDD	ND	81
Endosulfan II	220	81
4,4'-DDT	ND	81
Endrin aldehyde	ND	81
Methoxychlor	ND	400
Endosulfan sulfate	ND	81
Chlordane (technical)	ND	2,000
Toxaphene	ND	4,000
Aroclor-1016	ND	810
Aroclor-1221	ND	1,600
Aroclor-1232	ND	810
Aroclor-1242	ND	810
Aroclor-1248	ND	810
Aroclor-1254	ND	810
Aroclor-1260	ND	810

QC Batch: P0811-B1

Surrogate Recovery:

2,4,5,6-Tetrachloro-m-xylene DL

Decachlorobiphenyl DL

ND = Not detected

DL = Diluted out



Analysis Report: Organochlorine Pesticides

Client: Foster Wheeler Environmental Corp.
 Client ID: OV-EBS28SSP40-2
 Lab ID: D1215-03
 Analysis: Method 8080

Analysis Date: 8/12/97
 Matrix: Soil, 92% solids
 Concentration In: ug/kg, dry weight basis
 Dilution: 1

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
alpha-BHC	ND	1.8
gamma-BHC	ND	1.8
Heptachlor	ND	1.8
Aldrin	ND	1.8
beta-BHC	ND	1.8
delta-BHC	ND	1.8
Heptachlor epoxide	ND	1.8
Endosulfan I	ND	1.8
4,4'-DDE	ND	3.7
Dieldrin	ND	3.7
Endrin	ND	3.7
4,4'-DDD	ND	3.7
Endosulfan II	ND	3.7
4,4'-DDT	7.8	3.7
Endrin aldehyde	ND	3.7
Methoxychlor	ND	18
Endosulfan sulfate	ND	3.7
Chlordane (technical)	ND	82
Toxaphene	ND	180
Aroclor-1016	ND	37
Aroclor-1221	ND	74
Aroclor-1232	ND	37
Aroclor-1242	ND	37
Aroclor-1248	ND	37
Aroclor-1254	ND	37
Aroclor-1260	ND	37

QC Batch: P0811-B1

Surrogate Recovery:
 2,4,5,6-Tetrachloro-m-xylene 77%
 Decachlorobiphenyl 98%

ND = Not detected



Analysis Report: Organochlorine Pesticides

Client: Foster Wheeler Environmental Corp.

Client ID:

Lab ID: Method Blank, P0811-B1

Analysis: Method 8080

Analysis Date: 8/12/97

Matrix: Soil

Concentration in: ug/kg

Dilution: 1

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
alpha-BHC	ND	1.7
gamma-BHC	ND	1.7
Heptachlor	ND	1.7
Aldrin	ND	1.7
beta-BHC	ND	1.7
delta-BHC	ND	1.7
Heptachlor epoxide	ND	1.7
Endosulfan I	ND	1.7
4,4'-DDE	ND	3.4
Dieldrin	ND	3.4
Endrin	ND	3.4
4,4'-DDD	ND	3.4
Endosulfan II	ND	3.4
4,4'-DDT	ND	3.4
Endrin aldehyde	ND	3.4
Methoxychlor	ND	17
Endosulfan sulfate	ND	3.4
Chlordane (technical)	ND	85
Toxaphene	ND	170
Aroclor-1016	ND	34
Aroclor-1221	ND	68
Aroclor-1232	ND	34
Aroclor-1242	ND	34
Aroclor-1248	ND	34
Aroclor-1254	ND	34
Aroclor-1260	ND	34

QC Batch: P0811-B1

Surrogate Recovery:

2,4,5,6-Tetrachloro-m-xylene 90%

Decachlorobiphenyl 105%

ND = Not detected



Analysis Report: Organochlorine Pesticides

Lab Control Summary

Client: Foster Wheeler Environmental Corp.
Lab ID for Blank Spike: Lab Control Sample, P0811-LCS1
Analysis: Method 8080

Matrix: Solid

Analysis Date for Blank Spike: 8/12/97

<u>Analyte</u>	<u>% Recovery</u>
gamma-BHC (Lindane)	30
Heptachlor	95
Aldrin	88
Dieldrin	102
Endrin	129
4,4'-DDT	75

QC Batch: P0811-B1



Analysis Report: Total Metals

Client: Foster Wheeler Environmental Corp.

Client ID: DV-EBS28-PO3

Lab ID: D1215-01

Analysis Method: 7471A (Mercury)
6010A (Others)

Matrix: Soil, 89% Solids

Concentration in: mg/kg, dry weight basis

Analysis Date: 8/12/97

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limit</u>
Arsenic	3	1
Barium	8	1
Cadmium	0.1	0.1
Chromium	6	1
Lead	6.9	0.5
Mercury	ND	0.3
Selenium	ND	2
Silver	ND	1

QC Batch: 0807PBS

ND = Not detected



Analysis Report: Total Metals

Client: Foster Wheeler Environmental Corp.

Client ID: DV-EBS28-P45

Lab ID: D1215-02

Analysis Method: 7471A (Mercury)
6010A (Others)

Matrix: Soil, 42% Solids

Concentration in: mg/kg, dry weight basis

Analysis Date: 8/12/97

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limit</u>
Arsenic	ND	2
Barium	9	2
Cadmium	ND	0.2
Chromium	2	2
Lead	6	1
Mercury	ND	0.6
Selenium	5	4
Silver	ND	2

QC Batch: 0807PBS

ND = Not detected



Analysis Report: Total Metals

Client: Foster Wheeler Environmental Corp.

Client ID: DV-EBS28SSP40-2

Lab ID: D1215-03

Analysis Method: 7471A (Mercury)
6010A (Others)

Matrix: Soil, 92% Solids

Concentration in: mg/kg, dry weight basis

Analysis Date: 8/12/97

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limit</u>
Arsenic	3	1
Barium	13	1
Cadmium	ND	0.1
Chromium	8	1
Lead	8.0	0.5
Mercury	ND	0.3
Selenium	ND	2
Silver	ND	1

QC Batch: 0807PBS

ND = Not detected



Analysis Report: Total Metals

Client: Foster Wheeler Environmental Corp.

Client ID:

Lab ID: Prep Blank, 0807PBS

Analysis Method: 7471A (Mercury)
6010A (Others)

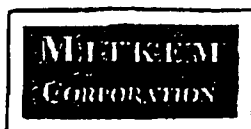
Concentration in: mg/kg

Analysis Date: 8/12/97

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limit</u>
Arsenic	ND	1
Barium	ND	1
Cadmium	ND	0.1
Chromium	ND	1
Copper	ND	0.5
Mercury	ND	0.3
Selenium	ND	2
Silver	ND	1

QC Batch: 0807PBS

ND = Not detected



Analysis Report: Total Metals

Client: Foster Wheeler Environmental Corp.

Client ID:

Lab ID: Lab Control Sample, 0807LCSS

Analysis Method: 7471A (Mercury)

6010A (Others)

Concentration in: mg/kg

Analysis Date: 8/12/97

<u>Analyte</u>	<u>% Recovery</u>
Arsenic	97
Barium	99
Cadmium	100
Chromium	101
Lead	93
Mercury	92
Selenium	85
Silver	103

QC Batch: 0807PBS



Analysis Report: Gasoline Range Organics (GRO)

Client: Foster Wheeler Environmental Corp.

Analysis: GRO by GC-FID

Matrix: Soil

Concentration in: mg/kg, dry weight basis

<u>Lab ID</u>	<u>Client ID</u>	<u>Result</u>	<u>Reporting Limit</u>	<u>% Solid</u>	<u>% Surrogate Recovery</u>	<u>Analysis Date</u>
D1191-01	DV-EBS28SSP40-2	ND	0.54	93	72*	8/1/97

QA/QC

Method Blank

V4B0801A

ND

0.50

88

8/1/97

Lab Control Sample (% Recovery)

V4L0801A

84

98

8/1/97

ND = Not detected

* Out of control limit due to matrix interference, verified by reanalysis (reanalysis recovery = 70%)



Analysis Report: Volatile Organic Compounds

Client: Foster Wheeler Environmental Corp.
Client ID: DV-EBS28SSP40-2
Lab ID: D1191-01
Analysis: Method 8240

Analysis Date: 8/2/97
Matrix: Soil, 93% solids
Concentration in: ug/kg, dry weight basis
Dilution: 1

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Chloromethane	ND	5
Vinyl chloride	ND	5
Bromomethane	ND	5
Chloroethane	ND	5
1,1-Dichloroethene	ND	5
Carbon disulfide	ND	5
Acetone	11	5
Methylene chloride	ND	5
trans-1,2-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
cis-1,2-Dichloroethene	ND	5
2-Butanone	ND	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
1,1,1-Trichloroethane	ND	5
Carbon tetrachloride	ND	5
Benzene	ND	5
Trichloroethene	ND	5
1,2-Dichloropropane	ND	5
Bromodichloromethane	ND	5
cis-1,3-Dichloropropene	ND	5
trans-1,3-Dichloropropene	ND	5
1,1,2-Trichloroethane	ND	5
Dibromochloromethane	ND	5
Bromoform	ND	5
4-Methyl-2-pentanone	ND	5
Toluene	ND	5
Tetrachloroethene	ND	5
2-Hexanone	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Xylenes, total	ND	5
Styrene	ND	5
1,1,2,2-Tetrachloroethane	ND	5

QC Batch V1B0802A

Surrogate Recovery:

1,2-Dichloroethane-d4	103%
Toluene-d8	101%
Bromofluorobenzene	96%

ND= Not Detected



Analysis Report: Volatile Organic Compounds

Client: Foster Wheeler Environmental Corp.
Client ID:
Lab ID: Method Blank, V1B0802A
Analysis: Method 8240

Analysis Date: 8/2/97
Matrix: Soil
Concentration in: ug/kg
Dilution: 1

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Chloromethane	ND	5
Vinyl chloride	ND	5
Bromomethane	ND	5
Chloroethane	ND	5
1,1-Dichloroethene	ND	5
Carbon disulfide	ND	5
Acetone	ND	5
Methylene chloride	ND	5
trans-1,2-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
cis-1,2-Dichloroethene	ND	5
2-Butanone	ND	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
1,1,1-Trichloroethane	ND	5
Carbon tetrachloride	ND	5
Benzene	ND	5
Trichloroethene	ND	5
1,2-Dichloropropane	ND	5
Bromodichloromethane	ND	5
cis-1,3-Dichloropropene	ND	5
trans-1,3-Dichloropropene	ND	5
1,1,2-Trichloroethane	ND	5
Dibromochloromethane	ND	5
Bromoform	ND	5
4-Methyl-2-pentanone	ND	5
Toluene	ND	5
Tetrachloroethene	ND	5
2-Hexanone	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Xylenes, total	ND	5
Styrene	ND	5
1,1,2 2-Tetrachloroethane	ND	5

QC Batch: V1B0802A

Surrogate Recovery:

1,2-Dichloroethane-d4	103%
Toluene-d8	104%
Bromofluorobenzene	102%

ND= Not Detected



Analysis Report: Total Petroleum Hydrocarbons

Client: Foster Wheeler Environmental Corp.

Analysis: Method 418.1

Matrix: Soil

Concentration in: mg/kg, dry weight basis

<u>Lab ID</u>	<u>Client ID</u>	<u>Result</u>	<u>% Solid</u>	<u>Reporting Limit</u>	<u>Analysis Date</u>
D1191-01	DV-EBS28SSP40-2	170	93	23	8/5/97

QA/QC

Method Blank

10805-B1

ND

22

8/5/97

Lab Control Spike (% Recovery)

10805-LCS1

84

ND

8/5/97

ND = Not Detected



Analysis Report: Semivolatile Organic Compounds

Client: Foster Wheeler Environmental Corp.
Client ID: DV-EBS28SSP40-2
Lab ID: D1181-01
Analysis: Method 8270

Analysis Date: 8/5/97
Matrix: Soil, 93% solids
Concentration in: ug/kg, dry weight basis
Dilution: 1

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Phenol	ND	350
bis(2-Chloroethyl)ether	ND	350
2-Chlorophenol	ND	350
1,3-Dichlorobenzene	ND	350
1,4-Dichlorobenzene	ND	350
1,2-Dichlorobenzene	ND	350
2-Methylphenol	ND	350
2,2'-oxybis(1-Chloropropane)	ND	350
4-Methylphenol	ND	350
n-Nitroso-di-n-propylamine	ND	350
Hexachloroethane	ND	350
Nitrobenzene	ND	350
Isophorone	ND	350
2-Nitrophenol	ND	350
2,4-Dimethylphenol	ND	350
bis(2-Chloroethoxy)methane	ND	350
2,4-Dichlorophenol	ND	350
1,2,4-Trichlorobenzene	ND	350
Naphthalene	ND	350
4-Chloroaniline	ND	350
Hexachlorobutadiene	ND	350
4-Chloro-3-methylphenol	ND	350
2-Methylnaphthalene	ND	350
Hexachlorocyclopentadiene	ND	350
2,4,6-Trichlorophenol	ND	350
2,4,5-Trichlorophenol	ND	890
2-Chloronaphthalene	ND	350
2-Nitroaniline	ND	890
Dimethylphthalate	ND	350
Acenaphthylene	ND	350
2,6-Dinitrotoluene	ND	350
3-Nitroaniline	ND	890
Acenaphthene	ND	350
2,4-Dinitrophenol	ND	890
4-Nitrophenol	ND	890
Dibenzofuran	ND	350
2,4-Dinitrotoluene	ND	350



Client ID DV-EBS28SSP40-2

Lab ID: D1191-01

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Diethylphthalate	ND	350
Fluorene	ND	350
4-Chlorophenyl-phenylether	ND	350
4-Nitroaniline	ND	890
4,6-Dinitro-2-methylphenol	ND	890
m-Nitrosodiphenylamine	ND	350
4-Bromophenyl-phenylether	ND	350
Hexachlorobenzene	ND	350
Pentachlorophenol	ND	890
Phenanthrene	ND	350
Anthracene	ND	350
Di-n-butylphthalate	ND	350
Carbazole	ND	350
Fluoranthene	ND	350
Pyrene	ND	350
Butylbenzylphthalate	ND	350
Benzo(a)anthracene	ND	350
Chrysene	ND	350
1,3-Dichlorobenzidine	ND	350
bis(2-Ethylhexyl)phthalate	ND	350
Di-n-octylphthalate	ND	350
Benz (b)fluoranthene	ND	350
Benzo(k)fluoranthene	ND	350
Benzo(a)pyrene	ND	350
Indeno(1,2,3-cd)pyrene	ND	350
Dibenz(a,h)anthracene	ND	350
Benzo(g,h,i)perylene	ND	350

QC Batch: S0805-B2

Surrogate Recovery:

2-Fluorophenol	72%
Phenol-d5	64%
2-Chlorophenol-d4	72%
2,4,6-Tribromophenol	132%
1,2-Dichlorobenzene-d4	59%
Nitrobenzene-d5	59%
2-Fluorobiphenyl	71%
p-Terphenyl-d14	118%

ND = Not detected

Reported at below the Reporting Limit

1237 East Broadway Road, Suite 210 • Tempe, Arizona 85282
(602) 303-9535 • Fax (602) 921-2853

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

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WHITE: LABORATORY COPY

YELLOW:

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PINK: CLIENT'S COPY

06/05/87 TUE 15:27 FAX 401 732 3488

MILTEX CORPORATION

WUSTL

UNCLAS 100-471744 100-3700

Date: 8-1-97 Time: 11:30

<u>TPH</u>	<u>IR</u>	<u>BNA</u>	<u>Herb</u>	<u>P/P</u>	<u>Wet</u>	<u>Met</u>	<u>V-GC</u>	<u>V-MS</u>	<u>Sub</u>
0	1	1	0	0	0	0	0	2	0

Attn: Rita Lee

**Analysis Report: Total Petroleum Hydrocarbons****Client:** Foster Wheeler Environmental Corp.**Analysis:** Method 418.1**Matrix:** Soil**Concentration in:** mg/kg, dry weight basis

<u>Lab ID</u>	<u>Client ID</u>	<u>Result</u>	<u>% Solid</u>	<u>Reporting Limit</u>	<u>Analysis Date</u>
D1184-01	DV-EBS28-P03	88	89	25	8/4/97
D1184-02	DV-EBS28-P45	5,100	44	2,500	8/4/97

QA/QC**Method Blank****I0804-B1****ND****22****8/4/97****Lab Control Spike (% Recovery)****I0804-LCS1****102****8/4/97****ND = Not Detected**

**Analysis Report: Gasoline Range Organics (GRO)****Client:** Foster Wheeler Environmental Corp.**Analysis:** GRO by GC-FID**Matrix:** Soil**Concentration in:** mg/kg, dry weight basis

<u>Lab ID</u>	<u>Client ID</u>	<u>Result</u>	<u>Reporting Limit</u>	<u>% Solid</u>	<u>Surrogate Recovery</u>	<u>Analysis Date</u>
D1184-01	DV-EBS28-P03	ND	0.56	89	76	8/6/97
D1184-02	DV-EBS28-P45	ND	1.1	44	93	8/6/97

QA/QC**Method Blank**

V4B0806A

ND

0.50

86

8/6/97

Lab Control Sample (% Recovery)

V4L0806A

112

92

8/6/97

ND = Not detected



Analysis Report: Semivolatile Organic Compounds

Client: Foster Wheeler Environmental Corp.
 Client ID: DV-EBS28-P03
 Lab ID: D1184-01
 Analysis: Method 8270

Analysis Date: 8/4/97
 Matrix: Soil, 89% solids
 Concentration in: ug/kg, dry weight basis
 Dilution: 1

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Phenol	ND	370
bis(2-Chloroethyl)ether	ND	370
2-Chlorophenol	ND	370
1,3-Dichlorobenzene	ND	370
1,4-Dichlorobenzene	ND	370
1,2-Dichlorobenzene	ND	370
2-Methylphenol	ND	370
2,2'-oxybis(1-Chloropropane)	ND	370
4-Methylphenol	ND	370
n-Nitroso-di-n-propylamine	ND	370
Hexachloroethane	ND	370
Nitrobenzene	ND	370
Isophorone	ND	370
2-Nitrophenol	ND	370
2,4-Dimethylphenol	ND	370
bis(2-Chloroethoxy)methane	ND	370
2,4-Dichlorophenol	ND	370
1,2,4-Trichlorobenzene	ND	370
Naphthalene	ND	370
4-Chloroaniline	ND	370
Hexachlorobutadiene	ND	370
4-Chloro-3-methylphenol	ND	370
2-Methylnaphthalene	ND	370
Hexachlorocyclopentadiene	ND	370
2,4,6-Trichlorophenol	ND	370
2,4,5-Trichlorophenol	ND	930
2-Chloronaphthalene	ND	370
2-Nitroaniline	ND	930
Dimethylphthalate	ND	370
Acenaphthylene	ND	370
2,6-Dinitrotoluene	ND	370
3-Nitroaniline	ND	930
Acenaphthene	ND	370
2,4-Dinitrophenol	ND	930
4-Nitrophenol	ND	930
Dibenzofuran	ND	370
2,4-Dinitrotoluene	ND	370



Client ID: DV-EBS28-P03

Lab ID: D1184-01

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Diethylphthalate	ND	370
Fluorene	ND	370
4-Chlorophenyl-phenylether	ND	370
4-Nitroaniline	ND	930
4,6-Dinitro-2-methylphenol	ND	930
n-Nitrosodiphenylamine	ND	370
4-Bromophenyl-phenylether	ND	370
Hexachlorobenzene	ND	370
Pentachlorophenol	ND	930
Phenanthrene	ND	370
Anthracen	ND	370
Di-n-butylphthalate	ND	370
Carbazole	ND	370
Fluoranthene	ND	370
Pyrene	ND	370
Butylbenzylphthalate	ND	370
Benzo(a)anthracene	ND	370
Chrysene	ND	370
3,3'-Dichlorobenzidine	ND	370
bis(2-Ethylhexyl)phthalate	ND	370
Di-n-octylphthalate	ND	370
Benzo(b)fluoranthene	ND	370
Benzo(k)fluoranthene	ND	370
Benzo(a)pyrene	ND	370
Indeno(1,2,3-cd)pyrene	ND	370
Dibenz(a,h)anthracene	ND	370
Benzo(g,h,i)perylene	ND	370

QC Batch: S0804-B1

Surrogate Recovery:

2-Fluorophenol	34%
Phenol-d5	43%
2-Chlorophenol-d4	45%
2,4,6-Tribromophenol	72%
1,2-Dichlorobenzene-d4	52%
Nitrobenzene-d5	50%
2-Fluorobiphenyl	64%
p-Terphenyl-d14	92%

ND = Not detected



Analysis Report: Semivolatile Organic Compounds

Client: Foster Wheeler Environmental Corp.
 Client ID: DV-EBS28-P45
 Lab ID: D1184-02
 Analysis: Method 8270

Analysis Date: 8/5/97
 Matrix: Soil, 44% solids
 Concentration in: ug/kg, dry weight basis
 Dilution: 50

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Phenol	ND	38,000
bis(2-Chloroethyl)ether	ND	38,000
2-Chlorophenol	ND	38,000
1,3-Dichlorobenzene	ND	38,000
1,4-Dichlorobenzene	ND	38,000
1,2-Dichlorobenzene	ND	38,000
2-Methylphenol	ND	38,000
2,2'-oxybis(1-Chloropropane)	ND	38,000
4-Methylphenol	ND	38,000
n-Nitroso-di-n-propylamine	ND	38,000
Hexachloroethane	ND	38,000
Nitrobenzene	ND	38,000
Isophorone	ND	38,000
2-Nitrophenol	ND	38,000
2,4-Dimethylphenol	ND	38,000
bis(2-Chloroethoxy)methane	ND	38,000
2,4-Dichlorophenol	ND	38,000
1,2,4-Trichlorobenzene	ND	38,000
Naphthalene	ND	38,000
4-Chloroaniline	ND	38,000
Hexachlorobutadiene	ND	38,000
4-Chloro-3-methylphenol	ND	38,000
2-Methylnaphthalene	ND	38,000
Hexachlorocyclopentadiene	ND	38,000
2,4,6-Trichlorophenol	ND	38,000
2,4,5-Trichlorophenol	ND	94,000
2-Chloronaphthalene	ND	38,000
2-Nitroaniline	ND	94,000
Dimethylphthalate	ND	38,000
Acenaphthylene	19,000 J	38,000
2,6-Dinitrotoluene	ND	38,000
3-Nitroaniline	ND	94,000
Acenaphthene	740,000 D	38,000
2,4-Dinitrophenol	ND	94,000
4-Nitrophenol	ND	94,000
Dibenzofuran	220,000	38,000
2,4-Dinitrotoluene	ND	38,000



Client ID: DV-EBS28-P45

Lab ID: D1184-02

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Diethylphthalate	ND	38,000
Fluorene	690,000 D	38,000
4-Chlorophenyl-phenylether	ND	38,000
4-Nitroaniline	ND	94,000
4,6-Dinitro-2-methylphenol	ND	94,000
n-Nitrosodiphenylamine	ND	38,000
4-Bromophenyl-phenylether	ND	38,000
Hexachlorobenzene	ND	38,000
Pentachlorophenol	ND	94,000
Phenanthrene	570,000 D	38,000
Anthracene	840,000 D	38,000
Di-n-butylphthalate	ND	38,000
Carbazole	11,000 J	38,000
Fluoranthene	2,300,000 D	38,000
Pyrene	2,800,000 D	38,000
Butylbenzylphthalate	ND	38,000
Benz (a)anthracene	620,000 D	38,000
Chrysene	620,000 D	38,000
3,3'-Dichlorobenzidine	ND	38,000
bis(2-Ethylhexyl)phthalate	ND	38,000
Di-n-octylphthalate	ND	38,000
Benzo(b)fluoranthene	570,000 D	38,000
Benzo(k)fluoranthene	220,000	38,000
Benzo(a)pyrene	320,000 D	38,000
Indeno(1,2,3-cd)pyrene	74,000	38,000
Dibenz(a,h)anthracene	ND	38,000
Benzo(g,h,i)perylene	68,000	38,000

QC Batch: S0804-B1

Surrogate Recovery:

2-Fluorophenol	DL
Phenol-d5	DL
2-Chlorophenol-d4	DL
2,4,6-Tribromophenol	DL
1,2-Dichlorobenzene-d4	DL
Nitrobenzene-d5	DL
2-Fluorobiphenyl	DL
p-Terphenyl-d14	DL

DL = Diluted out

ND = Not detected

**Analysis Report: Semivolatile Organic Compounds**

Client: Foster Wheeler Environmental Corp.
Client ID:
Lab ID: Method Blank, S0804-B1
Analysis: Method 8270

Analysis Date: 8/4/97
Matrix: Soil
Concentration in: ug/kg
Dilution: 1

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Phenol	ND	330
bis(2-Chloroethyl)ether	ND	330
2-Chlorophenol	ND	330
1,3-Dichlorobenzene	ND	330
1,4-Dichlorobenzene	ND	330
1,2-Dichlorobenzene	ND	330
2-Methylphenol	ND	330
2,2'-oxybis(1-Chloropropane)	ND	330
4-Methylphenol	ND	330
n-Nitroso-di-n-propylamine	ND	330
Hexachloroethane	ND	330
Nitrobenzene	ND	330
Isophorone	ND	330
2-Nitrophenol	ND	330
2,4-Dimethylphenol	ND	330
bis(2-Chloroethoxy)methane	ND	330
2,4-Dichlorophenol	ND	330
1,2,4-Trichlorobenzene	ND	330
Naphthalene	ND	330
4-Chloroaniline	ND	330
Hexachlorobutadiene	ND	330
4-Chloro-3-methylphenol	ND	330
2-Methylnaphthalene	ND	330
Hexachlorocyclopentadiene	ND	330
2,4,6-Trichlorophenol	ND	330
2,4,5-Trichlorophenol	ND	830
2-Chloronaphthalene	ND	330
2-Nitroaniline	ND	830
Dimethylphthalate	ND	330
Acenaphthylene	ND	330
2,6-Dinitrotoluene	ND	330
3-Nitroaniline	ND	830
Acenaphthene	ND	330
2,4-Dinitrophenol	ND	830
4-Nitrophenol	ND	830
Dibenzofuran	ND	330
2,4-Dinitrotoluene	ND	330



Client ID:

Lab ID Method Blank, S0804-B1

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Diethylphthalate	ND	330
Fluoren	ND	330
4-Chlorophenyl-phenylether	ND	330
4-Nitroanilin	ND	830
4,6-Dinitro-2-methylphenol	ND	830
n-Nitrosodiphenylamine	ND	330
4-Bromophenyl-phenylether	ND	330
Hexachlorobenzene	ND	330
Pentachlorophenol	ND	830
Phenanthrene	ND	330
Anthracene	ND	330
Di-n-butylphthalate	ND	330
Carbazole	ND	330
Fluoranthene	ND	330
Pyren	ND	330
Butylbenzylphthalate	ND	330
Benzo(a)anthracene	ND	330
Chrysene	ND	330
3,3'-Dichlorobenzidine	ND	330
bis(2-Ethylhexyl)phthalate	ND	330
Di-n-octylphthalate	ND	330
Benzo(b)fluoranthene	ND	330
Benzo(k)fluoranthene	ND	330
Benzo(a)pyrene	ND	330
Indeno(1,2,3-cd)pyrene	ND	330
Dibenz(a,h)anthracene	ND	330
Benzo(g,h,i)perylene	ND	330

QC Batch: S0804-B1

Surrogate Recovery:

2-Fluorophenol	51%
Phenol-d5	56%
2-Chlorophenol-d4	60%
2,4,6-Tribromophenol	71%
1,2-Dichlorobenzene-d4	60%
Nitrobenzene-d5	66%
2-Fluorobiphenyl	67%
p-Terphenyl-d14	93%

ND = Not detected



Analysis Report: Volatile Organic Compounds

Client: Foster Wheeler Environmental Corp.
 Client ID: DV-EBS28-P03
 Lab ID: D1184-01
 Analysis: Method 8240

Analysis Date: 8/2/97
 Matrix: Soil, 89% solids
 Concentration in: ug/kg, dry weight basis
 Dilution: 1

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Chloromethane	ND	6
Vinyl chloride	ND	6
Bromomethane	ND	6
Chloroethane	ND	6
1,1-Dichloroethene	ND	6
Carbon disulfide	ND	6
Acetone	22	6
Methylene chloride	ND	6
trans-1,2-Dichloroethene	ND	6
1,1-Dichloroethane	ND	6
cis-1,2-Dichloroethene	ND	6
2-Butanone	ND	6
Chloroform	ND	6
1,2-Dichloroethane	ND	6
1,1,1-Trichloroethane	ND	6
Carbon tetrachloride	ND	6
Benzene	ND	6
Trichloroethene	ND	6
1,2-Dichloropropane	ND	6
Bromodichloromethane	ND	6
cis-1,3-Dichloropropene	ND	6
trans-1,3-Dichloropropene	ND	6
1,1,2-Trichloroethane	ND	6
Dibromochloromethane	ND	6
Bromoform	ND	6
4-Methyl-2-pentanone	ND	6
Toluene	ND	6
Tetrachloroethene	ND	6
2-Hexanone	ND	6
Chlorobenzene	ND	6
Ethylbenzene	ND	6
Xylenes, total	ND	6
Styrene	ND	6
1,1,2,2-Tetrachloroethane	ND	6

Surrogate Recovery:

QC Batch: V1B0802A

1,2-Dichloroethane-d4	104%
Toluene-d8	104%
Bromofluorobenzene	98%

ND= Not Detected



Analysis Report: Semivolatile Organic Compounds

Lab Control Summary

Client: Foster Wheeler Environmental Corp.

Matrix: Soil

Lab ID for Blank Spike: S0804-LCS1

Analysis: Method 8270

Analysis Date for Blank Spike: 8/4/97

<u>Analyte</u>	<u>% Recovery</u>
Phenol	60
2-Chlorophenol	62
1,4-Dichlorobenzene	62
n-Nitroso-di-n-propylamine	70
1,2,4-Trichlorobenzene	70
4-Chloro-3-methylphenol	75
Acenaphthene	72
4-Nitrophenol	70
2,4-Dinitrotoluene	75
Pentachlorophenol	56
Pyrene	80

QC Batch: S0804-B1



Analysis Report: Volatile Organic Compounds

Client: Foster Wheeler Environmental Corp.
 Client ID: DV-EBS28-P45
 Lab ID: D1184-02
 Analysis: Method 8240

Analysis Date: 8/2/97
 Matrix: Soil, 44% solids
 Concentration in: ug/kg, dry weight basis
 Dilution: 1

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Chloromethane	ND	11
Vinyl chloride	ND	11
Bromomethane	ND	11
Chloroethane	ND	11
1,1-Dichloroethene	ND	11
Carbon disulfide	ND	11
Acetone	560 D	11
Methylene chloride	ND	11
trans-1,2-Dichloroethene	ND	11
1,1-Dichloroethane	ND	11
cis-1,2-Dichloroethene	ND	11
2-Butanone	ND	11
Chloroform	ND	11
1,2-Dichloroethane	ND	11
1,1,1-Trichloroethane	ND	11
Carbon tetrachloride	ND	11
Benzene	ND	11
Trichloroethene	ND	11
1,2-Dichloropropane	ND	11
Bromodichloromethane	ND	11
cis-1,3-Dichloropropene	ND	11
trans-1,3-Dichloropropene	ND	11
1,1,2-Trichloroethane	ND	11
Dibromochloromethane	ND	11
Bromoform	ND	11
4-Methyl-2-pentanone	ND	11
Toluene	ND	11
Tetrachloroethene	ND	11
2-Hexanone	ND	11
Chlorobenzene	ND	11
Ethylbenzene	ND	11
Xylenes, total	12	11
Styrene	ND	11
1,1,2,2-Tetrachloroethane	ND	11

Surrogate Recovery:

QC Batch: V180802A

1,2-Dichloroethane-d4	110%
Toluene-d8	99%
Bromofluorobenzene	85%

ND= Not Detected



Analysis Report: Volatile Organic Compounds

Client Foster Wheeler Environmental Corp

Client ID:

Lab ID: Method Blank, V1B0802A

Analysis: Method 8240

Analysis Date: 8/2/97

Matrix: Soil

Concentration in: ug/kg

Dilution: 1

<u>Analyte</u>	<u>Results</u>	<u>Reporting Limits</u>
Chloromethane	ND	5
Vinyl chloride	ND	5
Bromomethane	ND	5
Chloroethane	ND	5
1,1-Dichloroethene	ND	5
Carbon disulfide	ND	5
Aceton	ND	5
Methyl ne chloride	ND	5
trans-1,2-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
cis-1,2-Dichloroethene	ND	5
2-Butanone	ND	5
Chloroform	ND	5
1,2-Dichloroethane	ND	5
1,1,1-Trichloroethane	ND	5
Carbon tetrachloride	ND	5
Benzene	ND	5
Trichloroethene	ND	5
1,2-Dichloropropane	ND	5
Bromodichloromethane	ND	5
cis-1,3-Dichloropropene	ND	5
trans-1,3-Dichloropropene	ND	5
1,1,2-Trichloroethane	ND	5
Dibromochloromethane	ND	5
Bromoform	ND	5
4-Methyl-2-pentanone	ND	5
Toluene	ND	5
Tetrachloroethene	ND	5
2-Hexanone	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Xylenes, total	ND	5
Styrene	ND	5
1,1,2,2-Tetrachloroethane	ND	5

Surrogate Recovery:

1,2-Dichloroethane-d4	103%
Toluene-d8	104%
Bromofluorobenzene	102%

QC Batch: V1B0802A

ND= Not Detected

05.06/87 WED 16:19 FAX 401 732 3488

Logged In As:

Reviewed By:

Date: 7-31-97

Time: 6:02

MITCHELL CORPORATION

FES:

er Wheeler Environmental Corp.
5 Davisville Rd.
Kingstown, RI 02852

Attn: Tricia Sumner
Phone: 294-6605
Fax: 294-9122

Foster Wheeler Environmental Corp.
2300 Lincoln Hwy East, One Oxford Valley
Langhorne, PA 19047

Attn: Rita Lee

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

[illegible]

WHITE: LABORATORY COPY

YELLOW: - NOT COPY

PINK: CLIENT'S COPY

W01
W02

Appendix B-4

Review Item 28 (UST Area)

Test Pit Logs (EA/FWENC)

Review Item 28 (UST Area)
Summary of Test Pit Logs (EA/FWENC)

Test Pit	Location	Dimensions	Comments
1	line 4 position 40 (within the foundation remnant)	11 ft × 18 ft × 8.5 ft	Steel reinforcing rods within the foundation wall and a large concrete and block slab that could not be broken with the backhoe were uncovered in this excavation. No evidence of USTs or stained and discolored soils were observed.
2	line 3 positions 20 through 60 (between the foundation remnant and pump island)	45 ft × 18 ft × 11 ft	During the excavation process, the pump island was overturned and pushed to one side. Two metal pipes were found extending from the pump island toward the foundation remnant. One pipe was visible at the surface and the second pipe was located approximately 2 ft bgs. The pipe below ground surface was approximately 3 ft long and capped at the end. The pipe visible at the surface was approximately 2 ft long and appeared to be used for electrical conduit. A jackhammer was used to break off a section of the pump island to determine if steel reinforcing rods were present. No reinforcing rods were found. The pump island contained three metal lightning rods, electrical conduit and wiring, and other piping associated with its past use. No evidence of USTs or stained and discolored soils were observed.
3	line 2 positions 40 through 80 (south of the pump island)	30 ft × 18 ft × 11 ft	Two 6-in. diameter vertical steel pipes were encountered at approximately 4 ft bgs. One pipe was found to be embedded into a large boulder. The excavation was continued around the second pipe until it was able to be pulled from the ground with the backhoe at approximately 11 ft bgs. The pipe pulled from the ground was 10 ft long. No evidence of USTs or stained and discolored soils were observed.
4	line 5 positions 0 through 20 (north of the foundation remnant)	22 ft × 3 ft × 9 ft	No evidence of USTs or stained and discolored soils were observed.
5	line 6 positions 50 through 60 (southern edge of the grid nest to the paved road)	17 ft × 6 ft × 7.5 ft	No evidence of USTs or stained and discolored soils were observed.
6	line 3 positions 80 through 120 (east of the pump island and foundation remnant)	45 ft × 10 ft × 10 ft	No evidence of USTs or stained and discolored soils were observed.
7	line 5 positions 20 through 60 (adjacent to test pits 4 and 5)	42 ft × 7 ft × 8 ft	No evidence of USTs or stained and discolored soils were observed.
8	line 2 positions 30 through 60 (south of Building E-107)	30 ft × 4 ft × 6 ft	Wood, metal, and glass debris were encountered at 6 ft bgs. A strong petroleum odor was also noted. A metal pipe was uncovered at the east end of the trench next to the asphalt road. The excavation was continued to follow the pipe to the north. The pipe entered a metal pontoon tank that was uncovered approximately 6 ft to the north. This tank was determined to be one of the septic tanks identified as EBS Review Item 60 that was not found during earlier investigations. (Two tanks and the pipe were subsequently removed.)
9	line 1 position 45 (adjacent to the asphalt paved road encircling the wooded area south of Building E-107)	20 ft × 3 ft × 6 ft	Wood, metal, and glass debris were encountered at 6 ft bgs. A strong petroleum odor was also noted. A metal pipe was uncovered at the east end of the excavation that was a continuation of the pipe found in test pit 8. The pipe extended south under the unnamed asphalt road and approximately an additional 50 ft south of the road into the wooded area, where it ended (no other connection at this end of the pipe was found).

TEST PIT LOG

EBS Review Item 28 - Test Pit 1

Location: Line 4 Position 40 in Pump Island Area. Test pit located within the remnant foundation wall.

Dimensions: 11 ft by 18 ft by 8.5 ft deep. Position 40 is roughly in the center of the test pit.

Soil Profile: 0 - 4" Black, silty organic soil.
4" - 8.5' Black/brown, silty - coarse sand with rounded stones to 3 in. Few large stones to 2 ft diameter encountered. Ground water at 8 ft below ground surface.

Reinforcing steel rods within the remnant of the foundation wall was found in this excavation. A large concrete and block slab was found at the bottom of the excavation that could not be moved with the backhoe.

No stained or discolored soils or evidence of USTs were observed in this excavation.

TEST PIT LOG

EBS Review Item 28 - Test Pit 2

Location: Line 3 Positions 20 through 60 in Pump Island Area. Test pit was located between the remnant foundation wall and the pump island.

Dimensions: 45 ft by 18 ft by 11 ft deep.

Soil Profile: 0 - 4" Black, silty organic soil.
4" - 11' Black/brown, silty - coarse sand with rounded stones to 2 in. Few large stones to 2 ft diameter encountered at the bottom of the test pit.

This excavation covered the entire area between the pump island and the foundation remnant. The pump island was overturned during the process of excavation and moved out of the way. Overturning the pump island exposed a network of piping, electrical conduit and lines, and 3 lightning rods approximately 3 ft long. Two capped steel pipes exited the bottom of the pump island to the north. The concrete pump island was broken with a jackhammer to determine if there was any reinforcing steel present, none was found in the pump island.

No stained or discolored soils or evidence of USTs were observed in this excavation.

TEST PIT LOG

EBS Review Item 28 - Test Pit 3

Location: Line 2 Position 40 through 80, adjacent to the south side of the pump island.

Dimensions: 30 ft by 18 ft by 11 ft deep.

Soil Profile: 0-4" - Black silty organic soil.

4" - 11' - Black/brown, silty - coarse sand with rounded stones from 1 " tp 2 ft diameter.

At approximately 4 ft below ground surface, 2 vertical pipes approximately 3 ft apart were uncovered. Excavation continued around the pipes until it was found that one pipe was drilled into rock. Excavation continued around the remaining pipe until it was pulled from the ground at 11 ft below ground surface. The pipes were 6 in diameter and 10 ft long.

No other metal objects, stained or discolored soils or evidence of USTs were encountered in this excavation.

TEST PIT LOG

EBS Review Item 28 - Test Pit 4

Location: Line 5 Positions 0-20. This test pit was adjacent to Westcott Road.

Dimensions: 22 ft by 3 ft by 9 ft deep. Excavation began at the edge of Westcott Road.

Soil Profile: 0-4" Black silty organic soil.

4" - 9' Brown, medium - coarse sand with stones to 6 in. Few large stones to 2 ft diameter.

No other metal objects, stained or discolored soils, or evidence of USTs were observed in this excavation.

TEST PIT LOG

EBS Review Item 28 - Test Pit 5

Location: Line 5 Positions 0-20. This test pit was adjacent to Westcott Road.

Dimensions: 17 ft by 6 ft by 7.5 ft deep. Excavation began at the edge of Westcott Road.

Soil Profile: 0- 6" Black silty organic soil.

6" - 2' Black silty sand.

2' - 7.5' Brown, medium - coarse sand with stones to 2 ft diameter.

No other metal objects, stained or discolored soils or evidence of USTs were observed in this excavation.

TEST PIT LOG

EBS Review Item 28 - Test Pit 6

Location: Line 3 Positions 80 through 120.

Dimensions: 45 ft by 10 ft by 10 ft deep.

Soil Profile: 0- 4" Black silty organic soil.

4" - 4' Black silty - medium sand with rounded stones to 3" diameter. Few large stones to 3 ft diameter.

4' - 11' Brown/black medium - coarse sand with 25% fine gravel. Groundwater at 7 ft below ground surface.

At position 100, a 6 in layer of tan medium sand at 1 ft below ground surface was present. No other metal objects, stained or discolored soils or evidence of USTs were observed in this excavation.

TEST PIT LOG

EBS Review Item 28 - Test Pit 7

Location: Line 5 Positions 20 through 60.

Dimensions: 42 ft by 7 ft by 8 ft deep.

Soil Profile: 0- 1' Brown/black silty organic soil.

1' - 2' Black silty - medium sand with rounded stones to 1" diameter.

2' - 4' Tan fine - medium sand with stones to 2" diameter.

4' - 8' Black silty - medium sand with stones to 1 ft diameter.

No other metal objects, stained or discolored soils or evidence of USTs were observed in this excavation.

TEST PIT LOG

EBS Review Item 28 - Test Pit 8

Location: Line 2 Positions 30 through 60. Test Pit 8 is located in the grid adjacent to the southeast corner of Building E-107.

Dimensions: 30 ft by 4 ft by 6 ft deep.

Soil Profile: 0- 1' Black silty sand.

1' - 3' Tan medium - coarse sand with rounded stones to 2 ft diameter.

3' - 6' Black silty sand with 20% clay. Approximately 50% of this layer consists of wood, metal, and glass debris with a strong petroleum odor.

A pipe was uncovered at the east end of the excavation. The pipe was then followed to the north approximately 3 ft to a metal pontoon septic tank. The pipe was broken in several places.

No other metal objects, stained or discolored soils or evidence of USTs were observed in this excavation.

TEST PIT LOG

EBS Review Item 28 - Test Pit 9

Location: Line 1 Position 45. Test Pit 9 is located in the grid adjacent to the southeast corner of Building E-107.

Dimensions: 20 ft by 3 ft by 6 ft deep.

Soil Profile: 0- 1' Black silty sand.

1' - 3' Tan medium - coarse sand with rounded stones to 2 ft diameter.

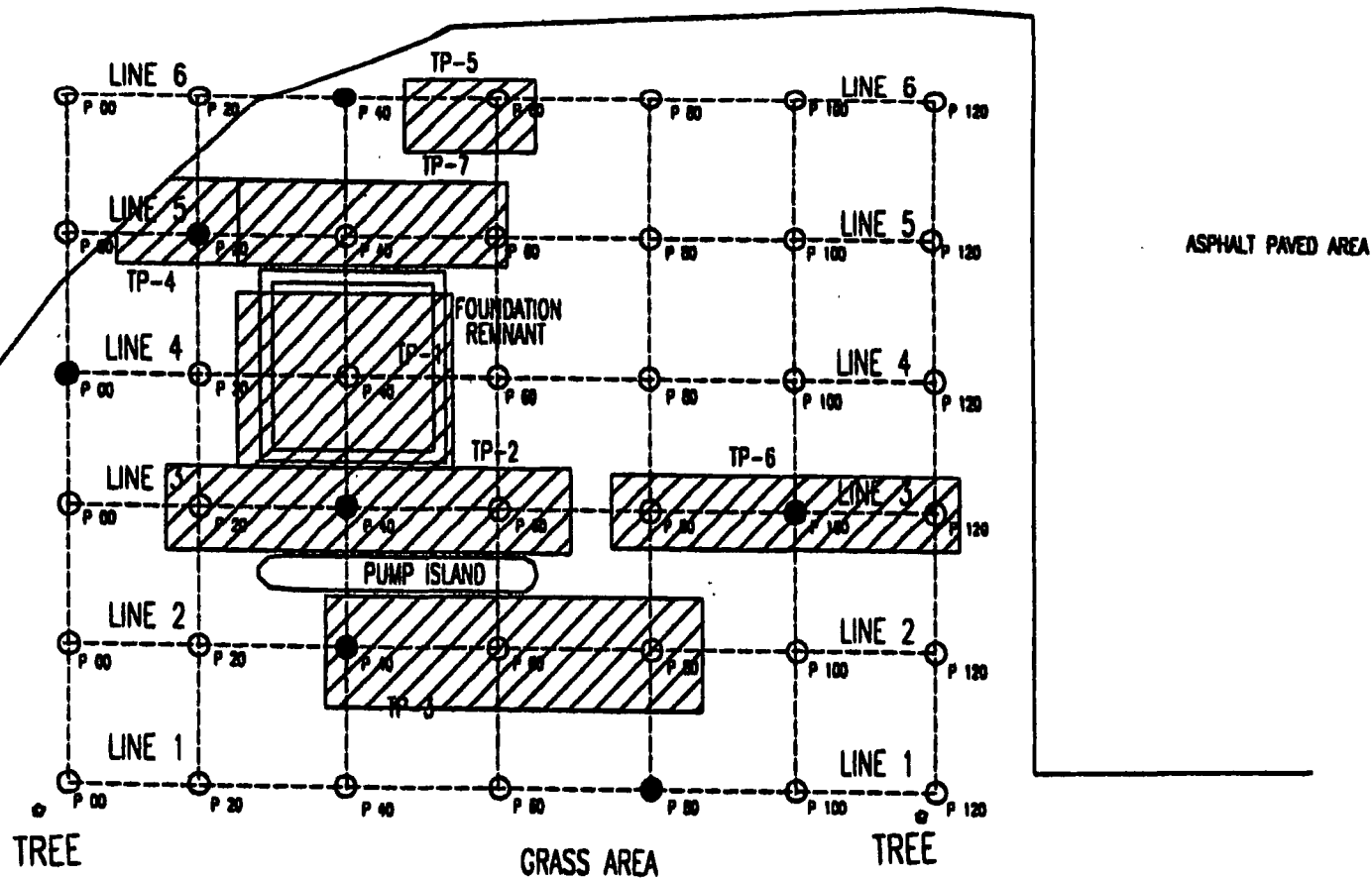
3' - 6' Black silty sand with 20% clay. Approximately 50% of this layer consists of wood, metal, and glass debris with a strong petroleum odor.

A pipe was uncovered at the east end of the excavation. The pipe was broken in several places.

N

ASPHALT PAVED AREA

GRASS



PAVED ROAD

GRASS

WESTCOTT
ROAD

LEGEND:

● LOCATION OF MAGNETIC ANOMALY
REQUIRING FURTHER INVESTIGATION



LOCATION OF TEST PITS

SITE TEST PIT LOCATION SKETCH

REVIEW ITEM 28
MAGNETOMETER SURVEY PUMP ISLAND AREA
NORTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
FINAL PHASE II EBS FOLLOW-ON INVESTIGATION
DAVISVILLE, RHODE ISLAND

DATE
3-4-88DRAWN BY
RWCCHECKED BY
RWCDESIGNED BY
JCPROJECT NUMBER
JCEA ENGINEERING,
SCIENCE, AND
TECHNOLOGY125 MILLER TURNPIKE
SPOKANE, ID 83426
(208) 325-0000PROJECT NUMBER
29500.60SCALE
NOT TO SCALEFILE NAME
FIG 4-40

LAYOUT NAME

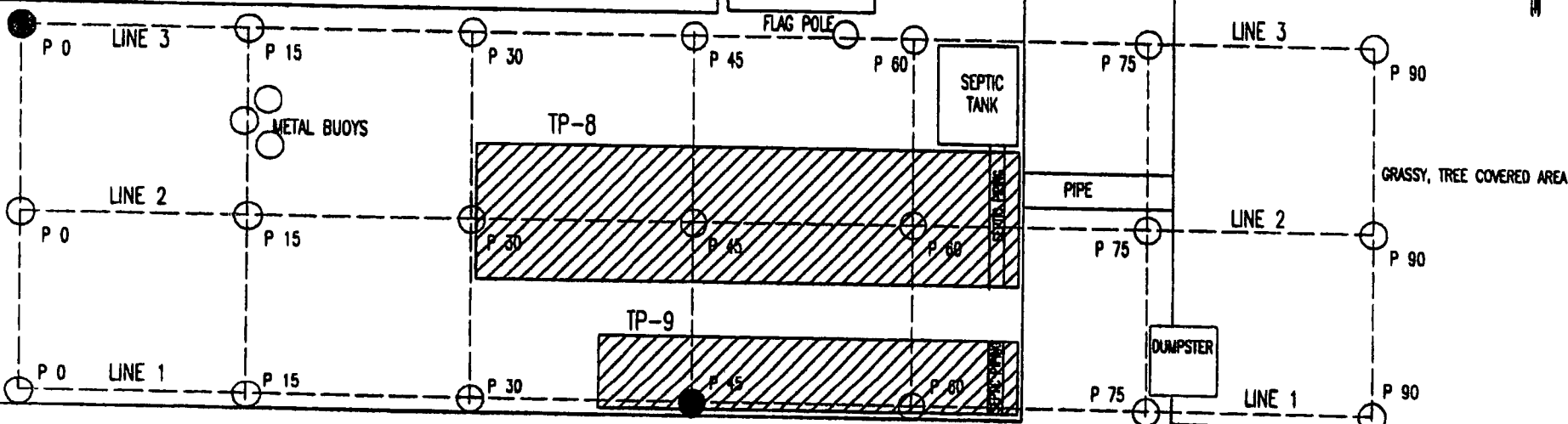
PLATE NUMBER
4-40

F:\PROJECTS\29500.60\2292\FOLLOWUP\DRAWING\CAAD\FIC4-40.DWG

BUILDING E-107

SHED

ALLEN HARBOR



LEGEND:

● LOCATION OF MAGNETIC ANOMALY
REQUIRING FURTHER INVESTIGATION



TP-8

LOCATION OF TEST PIT

SITE TEST PIT LOCATION SKETCH

REVIEW ITEM 28
MAGNETOMETER SURVEY BUILDING E-107
NORTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
FINAL PHASE II EBS FOLLOW-ON INVESTIGATION
NCBC DAVISVILLE, RHODE ISLAND

DATE 3-4-98

DESIGNED BY RWC

DRAWN BY RWC

CHECKED BY JC

PROJECT MANAGER JC



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY

175 WOODSIDE TURNPIKE
BOSTON, MA 01730
(781) 370-0040

PROJECT NUMBER
29600.60

SCALE
NOT TO SCALE

FILE NAME
FIG4-4E

DATE
3-4-98

F:\PROJECTS\29600.60\2292\FOLLOWUP\DRAWING\FIG4-4E.DWG

Appendix B-5

Review Item 60 (Septic Tanks Building E-107)

Tank Removal - Data Validation Report (included in Volume 2)

**EBS Follow-on Investigation
NCBC Davisville, RI**

Review Item	Location	Sample Number	Date Collected	SDG #	Matrix	Compounds Analyzed
58	Building E-319	EBS58-RSPT-02	7/17	971063	soil	TPH 418.1, 8015M, VOC, SVOC RCRA Metals
58	Building E-319	EBS58-RSPT-03 (DUP OF 01)	7/17	971063	soil	TPH 418.1, 8015M, VOC, SVOC RCRA Metals
60	Building E-107	EBS-60-RSPT-01	7/14	971023	soil	TPH 418.1, TPH 8015M, VOC, SVOC RCRA Metals
60	Building E-107	EBS-60-RSPT-02	7/14	971023	soil	TPH 418.1, TPH 8015M, VOC, SVOC RCRA Metals
71	Elevated TPH Operable Unit	EBS71-SB02-0-6	7/17	971063	soil	TPH 418.1, VOC, SVOC
71	Elevated TPH Operable Unit	EBS71-SB02-2-4	7/17	971063	soil	TPH 418.1, VOC, SVOC
71	Elevated TPH Operable Unit	EBS71-SB06-0-1	7/17	971063	soil	TPH 418.1, VOC, SVOC
71	Elevated TPH Operable Unit	EBS71-SB06-2-4	7/17	971063	soil	TPH 418.1, VOC, SVOC
71	Elevated TPH Operable Unit	EBS-71-RSB-03-0-1.75	7/2	970965	soil	TPH 418.1, VOC, SVOC
71	Elevated TPH Operable Unit	EBS-71-RSS-10	7/2	970965	soil	TPH 418.1, VOC, SVOC
74	Former Building W-319	EBS74-GW-01	7/17	971071	ground water	VOC, SVOC
74	Former Building W-319	EBS74-GW-02	7/17	871072	ground water	VOC, SVOC

**EBS Follow-on Investigation
NCBC Davisville, RI**

Review Item	Location	Sample Number	Date Collected	SDG #	Matrix	Compounds Analyzed
74	Former Building W-319	EBS74-GW-03	7/17	971072	ground water	VOC, SVOC
74	Former Building W-319	EBS74-GW-04	7/17	971072	ground water	VOC, SVOC
74	Former Building W-319	EBS74-MW-01	7/18	971073	ground water	VOC, SVOC
74	Former Building W-319	EBS74-MW-01-DUPE	7/18	971073	ground water	VOC, SVOC
74	Former Building W-319	EBS74-MW-02	7/18	971073	ground water	VOC, SVOC
75	Building 279	EBS75-SB02-2-3	7/17	971063	soil	TPH 418.1,8015M, VOC, RCRA Metals
SITE 11		11-SB01-0-2	7/16		soil	VOC,SVOC
SITE 11		11-SB01-4-5	7/16	971051	soil	VOC,SVOC
SITE 11		11-SB01-34-36	7/16	971051	soil	VOC,SVOC
SITE 11		11-SB02-0-2	7/17	971051	soil	VOC,SVOC
SITE 11		11-SB02-5-6	7/17	971051	soil	VOC,SVOC
SITE 11		11-GW-01S	7/16	971051	ground water	VOC,SVOC
SITE 11		11-GW-01P	7/16	971051	ground water	VOC,SVOC
Rinsate 1						
Rinsate 2						
Rinsate 3		EBS74RINSE	7/18			
		Trip Blank 1	7/17		water	VOC
		Trip Blank 2	7/18	971071	water	VOC

APPENDIX C

PHASE II EBS FOLLOW-ON ADDENDUM II INVESTIGATION

- C-1 Review Item 28 (Former Creosote Dip Tank and Fire
Fighting Training Areas)
 Boring Logs
 Data Validation Reports (included in Volume 2)**

- C-2 Review Item 28 (Former Creosote Dip Tank and Fire
Fighting Training Areas)
 Survey Data**

Appendix C-1

**Review Item 28 (Former Creosote Dip Tank and
Fire Fighting Training Areas)**

**Boring Logs
Data Validation Reports (included in Volume 2)**



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No.

60787 31

Client: ~~Hanscom Air Force Base~~

U.S. Navy; North Div

Location:

EB5-28

Drilling Method:

Mobile 61

140 lb hammer falling

30 in

Boring No.

28-SB-17

Sampling Method:

(Sheet of 1

Drilling Water Level

Date

Time

Surface Conditions: Grass/brush

Start

Drilling

Finish

10-17-98

Times

10-17-98

930

1000

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
SS	2 1/2		0-2	0	3 5 7 12	0 1		0-2- Dark brown, dry, silty SAND little gravel, trace organics @ surface
SS	2 1/4		2-4	0	3 5 2 2	2 3		2-4- Med-brown silty SAND, dry, trace gravel, loose
SS	2 1/2		4-6	0	1 2 1 1	4 5		4-6- Med-brown fine SAND, dry, loose
SS	2 1/2		6-8	0	4 92 77 15	6 7		6-8- Grading to Lt. brown, fine sand loose, pounded stone 7-8"
SS	2 1/2		8-10	0	7 13 10 10	8 9 10		8-10- same as 6-8" * collected samples 28-SB-17-8-10
						0		BoH @ 10'
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						10		

NOTES:

Logged by:

Steve Wehant

Drilling Contractor:

Environmental Drilling + Remediation

Driller:

Brad Hance

WELL SPECIFICATIONS:

Dia Screen/Riser

Screen Interval:

Sandpack:

Grout:

Bottom of Hole

Riser Interval:

Bentonite

Cover:



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No. 60787 31	Client: Hanscom Air Force Base U.S. Navy, North. Div.	Location: EBS-28
Drilling Method: <u>Mobile 61</u> <u>140 lb hammer</u> <u>falling 30 in</u>		Boring No. 28-SB-18
Sampling Method: <u>2" x 24" split</u> <u>spoon</u>		Sheet 1 of 1
Drilling Water Level		Start 10-17-98
Date		Drilling Times
Time		Finish 10-13-98
Surface Conditions: <u>grass; gravel</u>		1110 1140

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk	Blows per 5"	ft bgs	USCS Log	SOIL DESCRIPTION
SS	24/10		0-2	0	1 2 4 1	0 1	SM	0-2 - Med. brown, dry, silty SAND little gravel, loose, trace organics
SS	24/8		2-4	0	1 1 1	2 3		2-4 same as 0-2
SS	24/14		4-6	0	1 1 2 2	4 5		4-6 - same as 2-4, moist, wood chips; debris
SS	24/16		6-8	0	2 3 2 21	6 7		6-8 - same as 4-6, becoming wet.
SS	24/12		8-10	0	38 29 14 11	8 9		8-10 - Med Gray Gravel -> pounded rock fragment, pulverized Stone
SS	24/18		10-12		16 11 17 23	0 1 2 3 4 5 6 7 8 9 0		10-12 - DK. brown silty SAND, moist-wet * collected sample 28-SB-18-10-12 BoH @ 12'

NOTES:

Logged by:

Steve Welzent

Drilling Contractor:

Environmental Drilling & Remediation

Driller:

Brad Hease

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____

Screen Interval: _____

Sandpack: _____

Grout: _____

Bottom of Hole: _____

Riser Interval: _____

Bentonite: _____

Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No. 60787.31	Client: <u>Hanscom Air Force Base</u> <u>U.S. Navy; North Div.</u>	Location: <u>EBS-28</u>		
Drilling Method: <u>Mobile 61</u> <u>140 lb hammer</u> <u>Falling 30 in</u>		Boring No. <u>28-SB-19</u>		
Sampling Method: <u>2" x 24" Split</u> <u>Spoon</u>		1 Sheet 1 of 1		
Drilling Water Level		Start	Drilling	Finish
Date		10-17-98	Times	10-13-98
Time		1200		1240
Surface Conditions: <u>grass; gravel</u>				

Sample Type	Inches Driven/In. Recvd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
SS	24/16		0-2	0	6 5 8 4	0	SM	0-2 Mod to dark brown, dry, silty SAND, little gravel, loose.
SS	24/18		2-4	0	6 3 2 3	2		2-4 - Same as 0-2
SS	24/14		4-6	0	4 3 4 2	4		4-6 - Dark brown, dry, silty fine SAND, loose
SS	24/16		6-8	0	3 3 4 2	6		6-8 - Grading to mod. brown
SS	24/20		8-10	0	17 20 33 28	8		8-10 - Mod to DK. brown, moist, silty SAND, little gravel and rock fragments. loose, becoming firm @ bottom
						10		BOH @ 10' *collected 28-SB-19-B-10 and 28-SB-DUP1
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						0		

NOTES:

Logged by: Steve Welzant

Drilling Contractor: Environmental Drilling + Remediation

Driller: Bred Hease

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____
Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____
Surface Elevation: _____
Well Riser Elevation: _____

Job. No. 60787.31	Client: <u>Hancom Air Force Base</u> <u>U.S. Navy, North Div.</u>	Location: <u>FBS-28</u>
Drilling Method: <u>140 lb hammer</u> <u>freely falling 30 in</u> <u>Mobile rig</u>		Boring No. <u>28-SP-20</u>
Sampling Method: <u>2" x 24" Split</u> <u>Spoon</u>		1 Sheet 1 of 1
Drilling Water Level		Start 10-17-98
Date		Drilling Times
Time		Finish 10-13-98
Surface Conditions: <u>Grass</u>		840 915

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above blk.	Blows per 6"	ft bgs	USCS Log	SOIL DESCRIPTION
SS	24/20		0-2	15	3 7 8 18	0 1	SM	0-2 - Med-brown silty SAND, little gravel darker @ bottom, dry organics (trace) @ surface
SS	24/18		2-4	0	20 22 35 29	2 3		2-4 - Dark brown, moist, silty SAND, little gravel, trace charcoal
SS	24/18		4-6	0	23 32 10 12	4 5		4-6 - Dark brown silty, fine SAND, moist little gravel
SS	24/8		6-8	0	7 33 13 30	6 7		6-8 - Dark to med. brown, moist, SAND some silt, little gravel, trace wood chips
SS	24/12		8-10	0	15 15 12 13	8 9 10		8-10 - Dark brown, moist to wet silty SAND, little gravel * sample collected 28-SP-20-8-10 BOH @ 10'
						10		
						11		
						12		
						13		
						14		
						15		
						16		
						17		
						18		
						19		
						20		

NOTES:

Logged by: Steve Wolcott
Drilling Contractor: Environmental Drilling + Remediation
Driller: Brad Haase

WELL SPECIFICATIONS:

Dia Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____
Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____
Surface Elevation: _____
Well Riser Elevation: _____

Job No. 2960060	Client NORDIV, NAVFAC NCBC Davisville	Location: EBS-28
Drilling Method: Acker ATV split barrel sampler continuously.		Boring No. 28-GW-01
Sampling Method: Split Spoon		Sheet 1 of 1
Drilling Water Level		Start 800
Date		Drilling Times 1500
Time		Finish 10-15-98
Surface Conditions: grassy		10-15-98

Sample Type	Inches Driven/In. Recvd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
SS	24/6		0-2			0		0-2 Dk. brown, dry, silty fine SAND little gravel, trace organics
SS	24/12		2-4			2		2-4 - Brown, silty fine SAND, dry loose
SS	24/10		4-6			4		4-6 - Dark brown, off silty SAND, moist, little gravel, loose
SS	24/12		6-8			6		6-8 - same as 4-6
SS	24/14		8-10			8		8-10 - same as 6-8, wet
SS	24/		10-12			10		10-12 - pounded down to refusal @ 25'
SS	24/		12-14			12		collected GW sample 1000 [28-GW-01-23-25] [MS/MSD] and 1100 [28-GW-01-10-12]
						3		
						4		
						5		
						6		BoH @ 25'
						7		
						8		
						9		
						0		

NOTES:

Logged by:

Drilling Contractor:

Driller:

WELL SPECIFICATIONS:

Dia Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____
Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No.
296060

Client: NORDIV, NAVFAC
NCBC Davisville

Location: EBS-28

Drilling Method:
split barrel sampler continuously.

Boring No.
28-GW-02

Sampling Method:

Sheet 1 of

Drilling Water Level

Start

Drilling

Finish

Date

1430

Times

1700

Time

Surface Conditions: grass, brush

10-14-99

10-14-98

Sample Type	Inches Driven/in. Recvd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above blk.	Blows per 6"	Ft bgs	USCS Log
SS	2 1/4		0-2	6		0	
SS	2 1/6		2-4	-		1	
SS	2 1/6		4-6	-		2	
SS	2 1/10		6-8	0.2		3	
SS	2 1/12		8-10	11		4	
SS	2 1/12		10-12	2		5	
SS	2 1/10		12-14	0		6	
						7	
						8	
						9	
						10	
						11	
						12	
						13	
						14	
						15	
						16	
						17	
						18	
						19	
						20	

SOIL DESCRIPTION

Dk brown, dry, silty fine SAND, little gravel, trace organics

2-4 - no recovery

4-6 - no recovery

6-8 - Black, wet, silty fine SAND
little wood chips

8-10 - Black silt as above w/ some peat

10-12 - Gray, wet, fine SAND, some silt

12-14 - same as 10-12

- Drove rod to refusal @ 33'
collected GW sample

[28-GW-02-31-33]

- Drilled new hole 10' to the E
for collection of shallow GW sample

[28-GW-02-8-10]

NOTES:

Logged by:

Steve Welzant

Drilling Contractor:

Environmental Drilling/Remediation

Driller:

Brad Haese

WELL SPECIFICATIONS:

Dia. Screen/Riser: _____

Screen Interval: _____

Sandpack: _____

Grout: _____

Bottom of Hole: _____

Riser Interval: _____

Bentonite: _____

Cover: _____



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No.	Client: NORDIV, NAVFAC NCBC Davisville	Location: NCBC - EBS-28
Drilling Method: 140' Hammer split barrel sampler continuously - soil probe sampler		Boring No. 28-GW-03
Sampling Method: - Split Spoon		Sheet 1 of
Drilling Water Level		Start Date 3:15
Date		Drilling Times 1000
Time		Finish 10-12-98
Surface Conditions: GRASS		10-8-98 10-12-98

Sample Type	Inches Driven/In. Recvrd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above blk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
SS	24 / 9"		0-2			0		0-6" - brown fine sand, some coarse sand and gravel
						1		6-12" - dark brown sand w/ some gravel - dry
SS	24 / 2"		2-4			2		0-2" dark brown w/ rusty colored areas
						3	3:25	- piece of metal, glass mixed in with fine sand, little gravel
SS	24 / 10"		4-6			4		0-8" - wood fragments
						5		8-10" - black silt, sand mixed with some gravel
SS	24 / 20"		6-8 (*)			6		No recovery 0-2" - black silt to coarse sand - wet
						7		
SS	24 / 20"		8-10			8	4:30	No recovery 0-2" - wood chip as debris
						9		0-2" - black silt -
SS	24 / 6"		10-12 (*)			10		2"-6" - Peat - wet
						11		
SS	24 / 13"		12-14			12		0-8" - gray/olive gray fine sand
						3		8-13" - rusty, fluid to coarse sand - wet
						4		- rusty stained bands - washed - up to 1/2" wide
SS	24 /		14-16'			4		- drove rod to refusal for deep water sample
						5		
						6		
						7		
						8		
						9		
						0		

NOTES: (*) Driller noted problems in hole at 12' - decided to use 1st hole as shallows w/ (down to 9') and start a new hole for deep water sample - WELL SPECIFICATIONS:

Dia. Screen/Riser: _____ Screen Interval: _____ Sandpack: _____ Grout: _____
Bottom of Hole: _____ Riser Interval: _____ Bentonite: _____ Cover: _____

Logged by: P. Higgins

Drilling Contractor: E. D + R

Driller: Brad Haase

New hole ~ 2' north of 1st attempt at SS interval 76-8' hole - Boring log continues w/ second



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LOG OF SOIL BORING

Coordinates:

Surface Elevation:

Well Riser Elevation:

Job No.

Client:

NORDIV, NAVFAC

NCBC Davisville

Location:

EB5-28

Drilling Method:

split barrel sampler continuously. using

a soil probe method - 140 lb

hammer - Becker Rig

Sampling Method: 1 1/2" SS sampler

Boring No.

28-GW-04

Sheet 1 of

Drilling Water Level

Date

Time

Surface Conditions: PAVEMENT

Start

9:00

Drilling

Times

Finish

10-8-98

Sample Type	Inches Driven/In. Recvd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above blk.	Blows per 6"	Ft bgs	USCS Log
SS	24 / 13"	NA	0-2'		9:05	0	
SS	24 / 8"		2-4'			2	
SS	24 / 14"		4-6'			4	
SS	24 / 14"		6-8'			6	
SS	24 / 4"		8-10'			8	
SS	24 / 8"		10-12'		9:35	10	
SS	24 / 24"		12-14'			12	
SS	24 / 14"		14-16'			14	
SS	24 / 24"		16-18'			16	
SS	24 / 24"		18-20'			18	

SOIL DESCRIPTION

0-13" brown to dark brown silt to coarse sand, some gravel - fill? clay

0-24" as above
2-8" gray, fine to medium sand, some gravel, wood chips - clay

- 0-1" - wood chip - blocked recovery - moist

0-1" - black, silt to very fine sand wet

0-2" - as above - wet
2-4" - dark gray/olive very fine to fine sand wet

0-8" - silt to fine sand dark olive gray fine coarse sand, wet

0-14" - as above medium
14-20" - dark olive/gray fine to coarse sand
20-24" olive fine to medium sand - wet organic "peat" in tip

0-13" organic peat layer - wet
12-13" gray, fine sand - wet

0-20" - gray fine sand - wet
20-24" - olive silt to fine sand - layered (thin 1/2" - 1/4") wet

Hit Refusal @ 44'

Sampled G.W. 42-44'

NOTES:

after pulling spoon from 16-18' depth rods filled w/ sand 8' - decided to pound down to 21' & sample 24-26'

WELL SPECIFICATIONS:

Dia. Screen/Riser:

Screen Interval:

Sandpack:

Bottom of Hole:

Riser Interval:

Bentonite:

Cover:

Logged by:

Paul Higgins

Drilling Contractor:

Subsurface Drilling & Remediation

Driller:

Brad House

will stop continuous S.S. Grout & drive point

to refusal to sample G.W.



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and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job. No.	Client	NORDIV, NAVFAC NCBC Davisville	Location:	EB5-28
Drilling Method: 170 lb Hammer split barrel sampler continuously, using "Adair" rig - Soil Probe direct push system			Boring No.	28-GW-05
Sampling Method: Soil Probe w/ 1 1/2" - 24" long SS sampler			Sheet 1 of 2	
Drilling Water Level			Start	Drilling Times
Date			8:00	Finish 11:00
Time				
Surface Conditions: Grass / Shrub			10-7-98	

Sample Type	Drift Driven/In. Record	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bl.	Blows per 5"	Ft bgs	USCS Log	SOIL DESCRIPTION
SS	24 4"		0-2		205	0		0-7" - gray to brown fine to coarse sand w/ some gravel, clay
						1		7-9" - brown, fine to medium sand - clay
SS	24 8"		2-4'			2		0-8" - dark brown fine to medium sand, some silt, some gravel, clay
						3		
SS	24 6"		4-6'			4		0-6" - dark brown to gray, silt to coarse sand, some gravel, glass, burnt wood, moist - no PID hits
						5		
SS	24 7"		6-8'			6		0-7" as above - moist
						7		
SS	24 2"		8-10'			8		0-2" as above mixed with wood frags - wet - no PID hits
						9		
SS	24 8"		10-12'			10		0-8" - as in 8-10' above - wet, more gravel - no PID hits
						11		
SS	24 6"		12-14'		7:00	12		- no recovery
						3		
SS	24 2"		14-16'			4		0-1" - wood chip
						5		1-2" - dark gray to black silt to very fine sand, wet
SS	24 24"		16-18'		9:30	6		0-24" gray, grading into olive near bottom, very fine to fine sand, some little coarse sand and gravel - wet
						7		
SS	24 NA					8		No Sample - No Recovery
						9		See next page - Refused @ 46'
						0		

NOTES:

4' running sands after pulling
from interval 16-18' - will pound down
solid point to 5' try to sample @ that
depth

WELL SPECIFICATIONS:

Drift Screen/Riser: _____

Bottom of Hole: _____

Screen Interval: _____

Riser Interval: _____

Sandpack: _____

Bentonite: _____

Grout: _____

Cover: _____

Logged by: Paul Higgins

Drilling Contractor: Subsurface Drilling & Remediation

Driller: Brad Haase



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates:

Surface Elevation:

Well Riser Elevation:

Job No.

Client:

NORDIV, NAVFAC
NCBC Davisville

Location:

Drilling Method:

split barrel sampler continuously.

Boring No.

28-GW-05

Sampling Method:

Drilling Water Level

Date

Time

Surface Conditions:

Sheet 2 of 2

Start

Drilling
Times

Finish

10-7-98

SOIL DESCRIPTION

Refusal: @ 46'
very tight near bottom -
- placed shallow well point -
approximately 2' further into
- pounded down to 10' - placed
10' section of 1" PVC screen in
boring - sampled 6'W after
purging about 1/2 gal -
sampled from around 8.5-9'
below ground surface, directly
at/below the apparent gravel
interface.

NOTES:

Logged by:

Drilling Contractor:

Driller:

WELL SPECIFICATIONS:

Dia. Screen/Riser:

Screen Interval:

Sandpack:

Grout:

Bottom of Hole:

Riser Interval:

Bentonite:

Cover:



EA Engineering, Science,
and Technology, Inc.

LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No.

60707-31

Client: Hanscom Air Force Base

Location:

EB 5-28

Drilling Method: Vibratory Hammer

1 3/4" soil probe

Boring No.

28-6W06D

Sampling Method: 1 3/4" SS split

Spore sample - 24" long

Drilling Water Level

Date

Time

Surface Conditions: gravel / chert

Sheet 1 of 1

Start

10:30

Drilling

Times

Finish

10-6-88

Sample Type	Inches Driven/In. Recvd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above blk.	Blows per 6"	Ft bgs	USCS Log
SS	24 / 11		0-2			0	
SS	24 / 11		2-4		10:45	2	
SS	27 / 5		4-6			4	
SS	24 / 3		6-8		II	6	
SS	24 / 0		8-10			8	
SS	24 / 15		10-12			10	
SS	24 / 3		12-14		11:15	12	
SS	24 / 24		14-16		11:25	14	
SS	24 /		16-18			16	
SS	24 /		18-20			18	
SS	24 /		20-22			20	

SOIL DESCRIPTION

0-11" - light gray, silt to coarse sand w/ some gravel, clay

0-4" - tan, medium to coarse sand, little fine, clay

4-11" - dark brown to dark gray, fine to medium to coarse sand, few gravel, clay

No recovery

0-3" - gray, fine to medium sand, few gravel wet -

NO Recovery -

0-4" - dark brown medium to coarse sand, minor gravel, some silt-wet.

4-11" - silty brown to dark gray, "peat" - wet

0-3" dark gray very fine sand and silt-wet

0-24" - olive brown medium to fine sand - wet, little coarse sand

- running sand filled as voids to 8' - with pull up replace point and hammer down to refusal - to get a water sample.

- refusal @ 37'

pull up outer rods 2' to expose 12' inner screen - purge well water for sample

NOTES:

initial boring will be advanced to refusal - hit running sand at 16' - filled voids to 8' - can't sample soil - will hammer down to refusal & take water sample

WELL SPECIFICATIONS:

Dia. Screen/Riser:

Bottom of Hole:

Screen Interval:

Riser Interval:

Sandpack:

Bentonite:

Grout:

Cover:

Logged by:

Drilling Contractor:

Driller:

P. Higgins

Subsurface Drilling & Remediation
Brad Haas



EA Engineering, Science,
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LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job. No.

60787.31

Client: Hanscom Air Force Base

Location: _____

Drilling Method:

Mobile 61
140 lb hammer falling
30 in

Boring No.

28-6W-07

Sampling Method:

1 1/2" split spoon

Sheet 1 of

Drilling Water Level

Date

Time

Surface Conditions: grass

Start

10-17-96

Drilling

Times

Finish

Sample Type	Inches Driven/In. Recvrd	Opth Csg.	Samp # / depth (ft)	PID (ppm) Above bk	Blows per 6"	Ft bgs	USCS Log
SS	24/4		0-2	0		0	
						1	
SS	24/6		2-4	0		2	
						3	
SS	24/4		4-6	0		4	
						5	
SS	24/0		6-8	0		6	
						7	
SS	24/14		8-10			8	
						9	
SS	24/20		10-12			10	
						11	
SS	24/24		12-14			12	
						13	
SS	24/		14-16			14	
						15	
						16	
						17	
						18	
						19	
						20	

SOIL DESCRIPTION

0-2 - Dark brown, moist, silty SAND
little organic matter, gravel

2-4 - same as 0-2, no organics

4-6 - Dark brown, wet, c/f SAND, trace silt

6-8 - no recovery

8-10 Dk. brown to black, wet, F/C SAND
strong odor

9. organic layer -> peat

10-12 - Peat layer continued, wet

12-14 - grading to Dark gray fine SAND
wet, turning Dk. brown @ 13.5

14-16

↓ found down to refusal @ 29"

NOTES:

Logged by:

Steve Wilentz

Drilling Contractor:

Environmental Drilling + Remediation

Driller:

Brad Haase

WELL SPECIFICATIONS:

Dia. Screen/Riser:

Bottom of Hole:

Screen Interval:

Riser Interval:

Sandpack:

Bentonite:

Grout:

Cover:



EA Engineering, Science,
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LOG OF SOIL BORING

Coordinates: _____

Surface Elevation: _____

Well Riser Elevation: _____

Job No.	Client	NORDIV, NAVFAC NCBC Davisville		Location:	EBS-28	
Drilling Method: split barrel sampler continuously.				Boring No. 28-GW-08		
Sampling Method: 3 in split barrel EP				Sheet 1 of 1		
Drilling Water Level				Start	Drilling	Finish
Date				800	Times	1300
Time						
Surface Conditions: grass				10-16-98		10-16-98

Sample Type	Inches Driven/ft. Rec'd	Dpth Csg.	Samp # / depth (ft)	PID (ppm) Above bk.	Blows per 6"	Ft bgs	USCS Log	SOIL DESCRIPTION
SS	2 1/2		0-2			0		0-2 - brown, dry, silty fine SAND, loose, trace organics
SS	2 1/2		2-4			2		2-4 - same as 0-2
SS	2 1/2		4-6			4		4-6 - no recovery
SS	2 1/2		6-8			6		6-8 - Dark brown to gray, silty fine SAND, medium , little gravel
SS	2 1/2		8-10			8		8-10 as above, wet
SS	2 1/2		10-12			10		10-12 dk. brown to gray, silty SAND wet.
						12		- pounded down to refusal @ 31' collected sample
						3		[28-GW-08-29-31]
						4		and
						5		shallow Gw sample @ 10'
						6		[28-GW-08-8-10] ← parent
						7		[28-GW-DUP1]
						8		Bottom @ 31'
						9		
						0		

NOTES:

Logged by:

Drilling Contractor:

Driller:

Steve Wetzant

Subsurface DrR

Bred Harse

WELL SPECIFICATIONS:

☐ dia. Screen/Riser: _____

☒ Bottom of Hole: _____

Screen Interval: _____

Riser Interval: _____

Sandpack: _____

Bentonite: _____

Grout: _____

Cover: _____

Appendix C-2

Review Item 28 (Former Creosote Dip Tank and Fire Fighting Training Areas)

Survey Data

LOCATION AND ELEVATION SURVEY DATA EBS REVIEW ITEM 28 NCBC, DAVISVILLE, RI

Date 12/08/98

Coordinates are R.I. Grid
Elevations are NGVD

LEGEND :

TC = Top of well casing
RIM = Rim of well
PVC = Top of pvc pipe

Point No.	North	East	Elev	Description
300	194266.27	522864.01	22.95	SB-02
301	194399.30	522808.53	23.54	SB-03
302	194119.55	522761.57	30.28	SB-16
303	194323.00	522859.95	22.55	SB-01
304	194440.08	522912.88	19.18	SB-05
305	194461.57	522916.60	19.13	SB-15
306	194466.44	522911.70	19.23	TP-1
307	194476.37	522918.34	19.09	SB-17
308	194476.79	522924.91	18.76	SB-13
309	194469.12	522862.29	20.09	SB-04
310	194516.48	522876.95	19.76	TP-2
311	194534.32	522875.53	19.45	SB-18
312	194555.21	522875.22	19.15	SB-06
313	194549.06	522835.19	20.66	SB-19
314	194536.13	522818.97	21.74	SB-01B
315	194524.17	522818.81	22.34	SB-01A
316	194523.45	522835.09	21.20	SB-01D
317	194533.72	522836.36	21.04	SB-01C
318	194534.21	522831.99	21.29	TP-3
319	194588.09	522968.28	16.09	GW-01S PVC
320	194588.09	522968.28	15.49	GW-01S GND
321	194587.84	522967.41	15.56	GW-01D
322	194427.91	522972.76	20.29	SS-01
323	194424.08	522968.55	18.25	NEAR SS-01
324	194416.90	523020.72	17.02	PIPE END
325	194561.45	523019.48	14.63	GW-02S PVC
326	194561.45	523019.48	14.63	GW-02S GND
327	194562.07	523018.91	14.11	GW-02D
328	194515.66	523048.16	15.03	GW-03S PVC
329	194515.66	523048.16	13.83	GW-03S GND
330	194516.30	523048.74	13.86	GW-03D
331	194473.57	522997.23	16.61	SB-12
332	194456.68	523044.78	15.76	GW-04S PVC
333	194456.68	523044.78	14.93	GW-04S GND